H8000FW Operating Manual

(for software version 5.3)

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IMPORTANT SAFETY INFORMATION

- Before powering up the unit, check that the voltage selector on the back panel is set correctly.
- Do not remove any covers or panels from the unit when the power is connected.
- No operator access to the internals of the unit is permitted - servicing must be performed by qualified personnel only.
- The unit must **not** be operated with a damaged or ungrounded power cord.
- Suitable ventilation must be provided for the unit at all times. In particular, the rear and side vents must **not** be obstructed. It is best if there is an inch or more clearance between the top of the H8000FW and the bottom of the units above and below.

How to Use This Manual

This manual applies to the Eventide H8000FW. For convenience, this and other members of the H8000FW family may be referred to as H8000FW except where the H8000 differs from the H8000FW. Most of the information in this manual also applies to H8000 and H8000A when running software version 5.2 or later.

The first and second chapters of this manual are the most important ones. The first is the ***Overview and Quickstart*** section. In it you will find essential information regarding the front panel, the back panel, and the general structure of the H8000FW. After these preliminaries are out of the way, you'll start using the H8000FW and learning the basic methodologies that you will employ whenever you use the H8000FW.

The ***Overview and Quickstart*** section is not meant to be complete. It's meant to get you up and running fast, circumventing thornier issues in favor of speed. If you would like to know more about a particular topic discussed in this chapter, look to the abundant references contained therein. They'll point you to "chunkier" discussions in the remainder of the manual.

Ideally, we would have you read through the ***Overview and Quickstart*** section with the H8000FW in front of you, following the examples. After you finish the ***Quickstart*** section, we'd have you play with the H8000FW for a while. Once the initial "new box euphoria" wears off a bit, we'd have you sit down and read the ***Operation*** section. A true appreciation and mastery of the H8000FW cannot be obtained without reading the manual! We'd have you consult the appendices only when you need specific, technical

information. Finally, when you need to find information days, weeks, months, and years down the road, we'd have you use the comprehensive ***Table of Contents*** and ***Index***.

In particular, a good understanding of ***The Comprehensive Input / Output Scheme*** on page 51 and ***Program Load, Save, Delete, Etc.*** on page 117 and beyond are necessary to get the best from the H8000FW. In order to use MIDI Program Change messages it is necessary to understand ***Loading a Program Via a MIDI Program Change Message*** as described on page 120.

For information about using the H8000FW with a PC or Mac see Using the H8000FW with a computer.

Overview and Quickstart

The Big Picture

The Eventide H8000FW is a programmable, multi-channel, multipurpose, 96kHz-capable, dual or monolithic digital signal processor (DSP), 24 bit digital audio signal processor with UltraShifter™ capability. That's a lot of adjectives! It is the successor to a long, proud line of digital signal processors that stretches back to a time when most audio manufacturers didn't know digital audio from Morse code.

The H8000FW is loaded with features that put it in a class by itself. It has 12 AES/EBU digital inputs and outputs, eight ADAT digital inputs and outputs, two S/P DIF digital inputs and outputs, and four analog inputs and outputs, as well as 16 channels or FireWire for connection to a PC or Mac and very comprehensive routing capabilities for controlling them. The H8000FW houses two independent signal processors, each having eight inputs and eight outputs (imaginatively dubbed "DSP A" and "DSP B"). The two processors can be run in parallel, in series, or in any mutant variation thereof. In addition, the H8000FW can run "monolithic programs" that use the processing resources of both DSP A and B to run just one large program.

The variety and depth of the programs that the H8000FW possesses are truly amazing, from lush reverbs, to choruses, to flanges, to delays, to pitch shifters, to dynamics, to EQs, to filters, to distortions, to synthesizers, to samplers, to ring modulators, and everything in-between. The H8000FW can do it all. And if that's not enough, DSP A boasts nearly three minutes of sample time *in addition* to the 44 seconds of delay time found on both DSP A and DSP B!

And for the user who is interested in making his or her *own* programs (if the huge number of factory programs aren't enough!), the H8000FW continues the "modular programming paradigm" that made the DSP4000 and its offspring famous. Programs are composed of individual building blocks, or "modules," that allow the user to create original programs. Inspiration and creativity are given no bounds. . .

As you read this manual, it may be easy to "lose sight of the forest for the trees." Always bear in mind the following:

- The H8000FW houses two independently running DSPs (digital signal processors). They are lovingly referred to as "DSP A" and "DSP B." Although they are both always *running*, you can only *view* the parameters for one DSP at a time. Use the PROCESSOR A/B key to toggle the display between the two DSPs. (Both DSPs can be combined to run a single, "monolithic" program - see below.)

- Each DSP runs "programs" that are stored in the system. "Programs" are the algorithms that manipulate your audio. With the exception of "large sampler programs" and some "long delay" programs, any program can be run on *either* DSP. Like two separate effects boxes, the parameters for the program running on DSP A are totally independent of the parameters for the program running on DSP B. Like two separate effects boxes, you can connect the outputs of one DSP to the inputs of the other, or use them completely independently.

- Some processing-intensive programs are designed to run on the resources of both DSPs. These "monolithic" programs use the input/output routing of DSP A. While a monolithic program is running, all parameters for DSP B disappear.

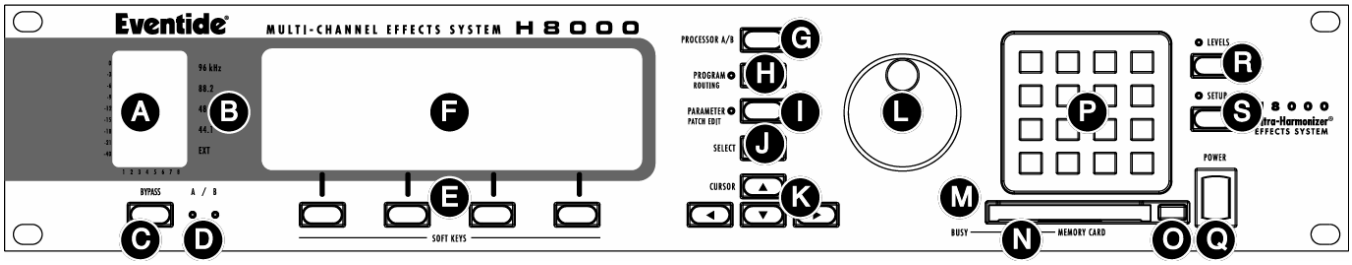
- DSP A and DSP B each have eight "virtual" inputs and outputs, which can be patched to the eight main inputs, each other, or any of their outputs.

See the inserted routing guide for complete routing details.

Never lose sight of the above facts!!! They are the foundation upon which we will build our understanding!!!

Knobs, Keys, and Jacks

If this is your first time learning the H8000FW, don't be put off by some of the rather in-depth descriptions that will follow; they exist for your future reference *(*once you understand the H8000FW and need a quick bit of information*)*. For now, concentrate on the *names* of the various knobs and jacks. Their use will be explained progressively throughout the rest of this manual.



The Front Panel

A) Level Meters These measure the eight signals selected for input, DSP A's eight inputs, DSP B's eight inputs, DSP A's eight outputs, DSP B's eight outputs, or the eight main outputs.

→ See ***The Level Meters*** on page 74.

B) System sampling rate and external sync indicator

The top four LEDs display the system sampling rate of the H8000FW: 96kHz, 88.2kHz, 48kHz, or 44.1kHz. When solidly lit, they indicate that the system sampling rate is exact (+/- *0.05%*). When blinking, they indicate that the system sampling rate is between one of the fixed rates (*the LED corresponding to the nearest sampling rate blinks*). The bottom LED, EXT, reflects the current external sync status.

→ See ***Understanding the "System Sampling Rate and External Sync Indicator" When Using the Internal Clock*** on page 85.

→ See ***Understanding the "System Sampling Rate and External Sync Indicator" When Using the External Clock*** on page 89.

C) BYPASS Press this key to bypass or mute the H8000FW. This key behaves differently depending on the settings made on the **bypass** menu page in the LEVELS area.

→ See ***Bypassing and Muting*** on page 92.

D) Bypass Status LEDs

A illuminated = DSP A is bypassed

B illuminated = DSP B is bypassed

both A and B blinking = system is bypassed

→ See ***Bypassing and Muting*** on page 92.

E) SOFT KEYS These four keys select the menus or events described immediately above them on the bottom line of the display.

→ See ***Understanding the Display and SOFT KEYS*** on page 16.

F) THE DISPLAY The display tells you what's going on. In the upper left-hand corner of the display is either the letter "**A**" or "**B**" or nothing at all. "**A**" indicates that what is shown on the display reflects the status of DSP A. Similarly, "**B**" indicates that what is shown on the display reflects the status of DSP B. When neither letter is shown, the H8000FW is running a "monolithic program" that uses the processing resources of DSP A and DSP B. (Note: the menu pages in the BYPASS, LEVELS, and SETUP areas have some displays that are common to both DSPs. In these areas, the "A" or "B" is irrelevant. However, in the PROGRAM, PARAMETER, and Patch Editor areas, menu pages are DSP specific.) The remainder of the top line displays the name of the program running on the currently displayed DSP and the current display area you're working in. The bottom line is dedicated to the four SOFT KEYS directly below the display. The middle section of the display changes depending on what you're doing!

→ See ***Understanding the Display and SOFT KEYS*** on page 16.

G) PROCESSOR A/B Press this key to toggle the display between the status of DSP A and DSP B. The upper left-hand corner of the display changes when you press this key; the "**A**" toggles to "**B**" and vice versa. Both DSPs are always running, but the display only shows the parameters pertaining to one of them at a time. If you're running a "monolithic program," this button does nothing.

H) PROGRAM/ROUTING Press this key briefly to access program functions such as loading, saving, deleting, etc. The DSP you are loading into or saving from is referred to in the left-hand corner of the display ("**A**" or "**B**"). To load into or save from the other DSP, press the PROCESSOR A/B key. If you load a "monolithic program" (indicated by a roman numeral "II" next to its name), it will effectively load into DSP A, and DSP B will disappear. If you load a "normal" program next, it will load into DSP A, and the "Thru'" program will be loaded on DSP B.

→ See ***Program Load, Save, Delete, Etc.*** on page 117.

Press and hold this key for one second to access the Routing Storage area where "routing configurations" are loaded and saved.

→ See ***Signal Flow Example*** on page 66.

Press and hold this key again for one more second to access the Setup Storage area where "setup configurations" are loaded and saved.

→ See ***Storing and Loading Setups*** on page 139.

Press and hold this key again for one more second to access the Usergroup Storage area where "usergroup" files may be renamed or deleted.

→See ***Using User Groups to Organize Useful Programs*** on page 45.

→See ***Miscellaneous Setup Options*** on page 140 to change the "one second hold time" required to enter the above areas.

I) PARAMETER/PATCH EDIT Press this key briefly to access parameters for the programs that are running. The parameters shown are for the program running on the DSP referred to in the left-hand corner of the display (**"A," "B,"** or nothing at all for monolithic programs). To see the parameters for the program running on the other DSP, press the PROCESSOR A/B key.

Press and hold the PARAMETER key for one second to access the Patch Editor. The patch shown is for the program running on the DSP referred to in the left-hand corner of the display (**"A," "B,"** or nothing).

→ See the separate Programmer's Manual for Patch Editor information.

→ See ***Miscellaneous Setup Options*** on page 140 to change the "one second hold time".

J) SELECT Press this key briefly to select something highlighted by the cursor or to load a program on the PROGRAM screen.

Press and hold this key for one second to set up a remote control for whatever parameter is highlighted on the display.

→ See ***Remote Controlling Parameters*** on page 113.

→ See ***Miscellaneous Setup Options*** on page 140 to change the "one second hold time".

K) CURSOR KEYS Press these keys to move the cursor on the display. The RIGHT CURSOR key moves the cursor right, the LEFT CURSOR key moves the cursor left, the UP CURSOR key moves the cursor up, and the DOWN CURSOR key moves the cursor down. (We only break from this convention in the case of loading programs, where the left and right cursor keys do some more interesting stuff!)

→ See ***Using the Cursor Keys, the SELECT key, the NUMERIC KEYPAD, and the KNOB*** on page 19.

L) THE KNOB Spin the KNOB to change the value of whatever parameter is highlighted.

→ See *Using the Cursor Keys, the SELECT key, the NUMERIC KEYPAD, and the KNOB* on page 19.

→ To change the "one second hold time," alter the "key hold" parameter on the [misc] menu page in the SETUP area (you may have to press the SETUP key several times to find it).

M) BUSY LED If a Memory Card is in place, this LED illuminates when data is being written to the card. Don't remove the Memory Card if this LED is lit! If no Memory Card is in place, this illuminates when data is present at the MIDI In port or at the serial port. Use the latter feature to troubleshoot communication problems between the H8000FW and the rest of the world.

N) MEMORY CARD SLOT Insert a Memory Card here to add new programs or to save your own.

→ See *Memory Cards* on page 49.

O) MEMORY CARD RELEASE Press this key to release the Memory Card (but don't press it if the BUSY LED is lit!).

P) The NUMERIC KEYPAD
Use the numbers, decimal point, and minus sign to enter numeric values or to enter numeric text in a text field.

CXL "Cancels" the last entered digit. It's like the backspace key on a computer.

⇧/⇩ KEYS Use these keys to increment or decrement a parameter's value. When entering the name of a program, the ⇧ key toggles between capital to lower-case letters and the ⇩ key toggles between "insert" and "overwrite" modes.

ENT (Enter) After you've entered a numeric value with the NUMERIC KEYPAD, press ENT to enter it. In many contexts, ENT behaves just like the SELECT key.

→ See *Using the Cursor Keys, the SELECT key, the NUMERIC KEYPAD, and the KNOB* on page 19.

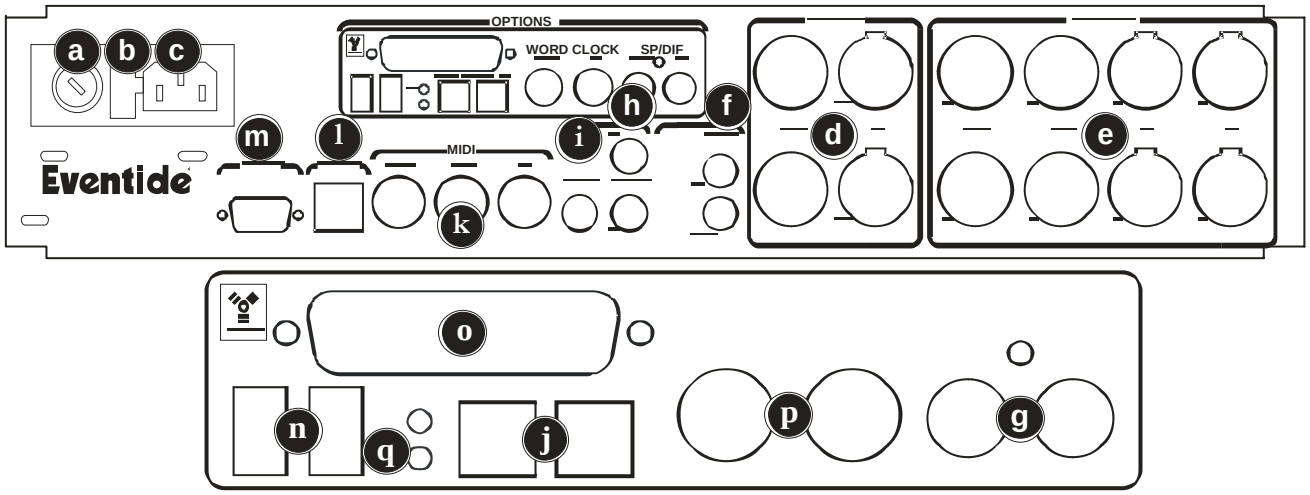
Q) POWER Flip this switch to bring the H8000FW to life! When the power is off the unit is bypassed, i.e., most audio inputs are connected to their corresponding audio output.

R) LEVELS Pressing this key accesses menus for metering and levels.

→ See *Controlling Levels* on page 74.

S) SETUP Pressing this key accesses menus for routing, digital configuration, MIDI configuration, service utilities, data dump utilities, and program advance options.

The Back Panel



a) AC VOLTAGE SELECTOR

Line up the dot with the triangle so that your preferred voltage is *up*. It is **absolutely essential** that you select the voltage corresponding to your local AC power! Check this carefully before first powering the unit, and after moving to a different country.

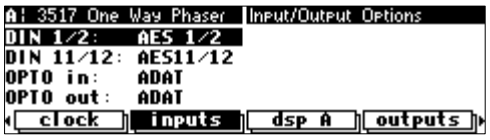
b) FUSE HOLDER A 1-Amp Slow Blow fuse. Always replace it with the correct value.

c) AC PORT Connect an IEC standard 3-prong AC power cord here. The center post is chassis ground.

AES/EBU Digital Audio Input/Output (Professional)

Use these connectors to connect professional digital audio gear to the H8000FW. These cables are differential with a shielded twisted pair. Eventide recommends the use of purpose-manufactured Digital Audio cables, which have low capacitance and a controlled impedance to better carry AES signals. Ordinary microphone cables will usually work at 48kHz, but are likely to reduce range and add jitter and possibly distortion to the signal. It is unlikely that long lengths of microphone cable will prove satisfactory for 96kHz operation.

d) AES/EBU INPUT AND OUTPUT JACKS



Connect these inputs and outputs to other AES/EBU-specified gear. If the parameter **DIN 1/2** on the **inputs** menu page in the SETUP area is set to **AES/EBU**, then digital inputs 1/2 are accepted at AES/EBU input 1/2 jack.

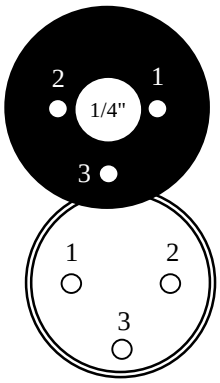
Note that AES/EBU 1/2 can be used as sync sources on the H8000 and H8000A, but not on the H8000FW.

→ See *Digital Setup* on page 80.

e) ANALOG AUDIO INPUT AND OUTPUT JACKS

The H8000FW's XLR analog audio output jacks are male. Pin #1 is ground. Pin #2 is +phase (hot) and pin #3 is -phase.

To "unbalance" the jack, use pins #1 ***and*** #3 as ground and use pin #2 as "hot." Be aware that this will reduce the maximum output level by 6dB, so you should usually reduce the output gain by 6dB to compensate.



⇒See *Controlling the Level of the Analog and Digital Outputs* on page 78.

If either pins #2 or #3 are unconnected, you will get more noise than signal !

The H8000FW's analog inputs accept either mono or stereo 1/4" connectors or balanced XLR connectors. The H8000FW's XLR input connectors are female. Pin #1 is ground. Pin #2 is +phase (hot) and pin #3 is -phase. These may be connected to an unbalanced input as described above.

To "unbalance" the XLR or 1/4" jack, use both pins #1 ***and*** #3 as ground and use pin #2 as "hot." ***If either pins #2 or #3 are unconnected, you will get more noise and hum than signal !***

These may be used as both line and guitar inputs, depending on the input level setting. Using a "mono" jack will correctly unbalance the input.

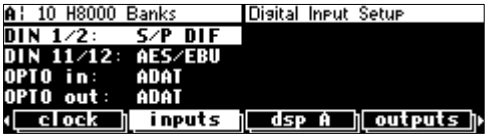
→ See *Controlling the Level of the Analog and Digital Inputs* on page 75.

S/P DIF Digital Audio Input/Output (Consumer)

S/P DIF is a consumer digital audio standard, with two audio channels encoded into a single connector. Use these connectors to hook up the H8000FW to CD players, DAT recorders, and other audio gear using this format. The connectors are two-conductor RCA jacks. Your plug should have the shield connected to the sleeve with the single shielded conductor connected at the tip.

Eventide recommends the use of professional quality cables made of RG-59/U coaxial cable. Ordinary "hi-fi" type leads will probably prove inadequate. Eventide does not recommend the use of S/PDIF at sample rates above 48kHz.

f) S/P DIF 1/2 INPUT AND OUTPUT JACKS

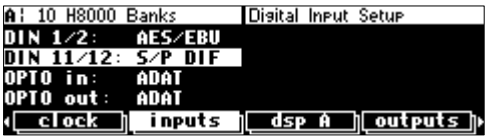


To enable the S/P DIF digital input 1/2, set **DIN 1/2** on the **inputs** menu page in the SETUP area to **S/P DIF**. This will disable AES1/2.

Note that these connectors can be used as sync sources on the H8000 and H8000A, but not on the H8000FW.

→ See *Digital Setup* on page 80.

g) S/P DIF 3/4 INPUT AND OUTPUT JACKS



To enable the S/P DIF digital input 3/4, set **DIN 11/12** on the **inputs** menu page in the SETUP area to **S/P DIF**. This will disable AES11/12. The input circuitry for S/P DIF 3/4 allows better performance than S/P DIF 1/2 and will operate better at 96kHz or with long leads.

h) FOOT PEDAL JACKS 1 AND 2

Stereo 1/4" connectors. The sleeve is ground reference, the ring is +5 volts (source), and the tip is an analog signal from 0 to 5 volts. Connect either foot switches, foot pedals, or control voltage sources to these inputs to modulate parameters or to trigger events (including remote program loads).

→ See *Foot Pedals 1 and 2* on page 94.

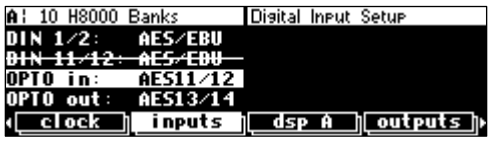
i) RELAY JACK

Two relays are connected to this stereo 1/4" connector. They can be controlled from suitable programs, allowing the H8000FW to drive real-world equipment, and can switch up to 1A at 30V dc. Relay #1 is connected between ring and sleeve, while Relay # 2 is connected between ring and tip. All of these connections are electrically isolated from the H8000FW. See the separate Programming Manual for information on controlling the relays.

j) OPTICAL INPUT AND OUTPUT JACK

These send and receive digital audio to and from other ADAT-capable devices, using a standard "light-pipe" connector. They also support SMUX operation, carrying four channels at 88.2 or 96kHz. To use signals from the ADAT input, select them at the

inputs menu page in the SETUP area. To route signals to the ADAT output, select them at the **outputs** menu page in the SETUP area.



These jacks may also be used as optical-type S/P DIF connectors. The optical input may be assigned to one pair of AES11/18, which will disable that pair as AES inputs. If AES11/12 is selected as an optical input it cannot also be selected as an electrical S/P DIF input so the **DIN11/12** control is disabled.

The optical output may be fed from any one pair from AES11/18. Clearly, if either of these connectors is used for S/P DIF the corresponding ADAT signals will be disabled.

k) MIDI

MIDI is used for instrument-to-instrument digital communications. The H8000FW sends and receives *Eventide system exclusive* messages that allow a MIDI sequencer or foot pedal (among other things) to remote control the H8000FW. In addition, the H8000FW may respond to standard MIDI messages and may output standard MIDI messages. The H8000FW has three MIDI ports:

IN - the H8000FW accepts (and processes) MIDI messages received at the MIDI In port. The connector is "7 pin" and can also send MIDI messages to a suitably equipped system. A normal "3 pin" MIDI cable can be used as a standard MIDI input.

OUT - the H8000FW sends MIDI messages to other devices via the Out port. *MIDI messages are also sent out the serial port if they are "enabled."*

THRU - Any MIDI information received at the MIDI In port is echoed directly to the MIDI Thru port regardless of the H8000FW's configuration (*as long as the H8000FW is powered up*) .

With the Memory Card removed, the BUSY *LED on the front panel illuminates whenever a MIDI message is received at the MIDI In port. Note: If the serial port is "enabled" and MIDI is "enabled," a command received over either the serial port or the MIDI In port causes the port* not *receiving the command to be ignored until the command is complete.*

→ See ***MIDI Setup*** on page 95.

l) EVE/NET

RJ45 jack for use with Eve/Net remote controllers. See the Eventide Web Site http://www.eventide.com for more information on Eve/Net. **Do not connect this jack to an Ethernet network or electrical damage may result.**

m) SERIAL PORT

An IBM PC type RS232 connector that looks like a modem or printer to a connected computer. Connect a "9 pin" serial cable to this port to transfer information to and from a personal computer. Do not use the "null modem" type of cable designed for file transfer between two computers - it will not work.

With the Memory Card removed, the BUSY *LED on the front panel illuminates whenever a message is received at the serial port. Note: If the serial port is "enabled" and MIDI is "enabled," a command received over either the serial port or the MIDI In port causes the port* not *receiving the command to be ignored until the command is complete.*

→ See ***Setting Up the Serial Port*** on page 141.

n) FIREWIRE CONNECTORS

Two identical IEEE-1394 FireWire connectors. Typically one is connected to a PC or Mac, and the other is available for "daisy-chain" connections to other FireWire devices or may be left unconnected.

Note: while FireWire is specified as being "hot-swappable", meaning that connectors may be plugged and un-plugged with power applied, Eventide recommends that this NOT be done, and that where possible FireWire connections be only changed when all equipment is powered down.

o) AES11/18 input and output connector

This DB25 connector carries the input and output signals for AES/EBU signals 11 to 18.

See ***Connecting AES 11 thru 18 to the H8000FW*** on page 156.

p) WORD CLOCK INPUT AND OUTPUT JACKS

The H8000FW sends a clock signal from its word clock output which can be used to synchronize other equipment to the H8000FW. The H8000FW can also slave to another device's word clock output.

q) STATUS LEDS

These two LEDs indicate the status of the FireWire subsystem. The top LED should be lit when a FireWire cable is connected. The lower one should flash from time to time to show activity, especially when a connected device becomes locked or unlocked. If it flashes rapidly and continuously, a bad connected device or connection is indicated.

Adjusting the Brightness and Contrast of the Display

Before we begin to describe the H8000FW's interface, we ought to make sure you can see the display! To adjust the contrast of the display, press the SETUP key four times, then press the leftmost SOFT KEY under the **display** menu. Turn the KNOB to adjust **cont**rast or press the DOWN CURSOR key and turn the KNOB to adjust **bright**ness.

The "Areas" of the H8000FW

The H8000FW's interface is divided into several functional "areas." You access each area by pressing its key. You'll know which area you're in because the LED next to its key illuminates (except for the BYPASS area, but that one's obvious). The areas are:

PROGRAM Press the PROGRAM key to access this area. Inside you'll find utilities for sorting programs, loading programs, saving programs, deleting programs, and grouping programs of your choosing into "user groups." Press the PROGRAM key to access additional SOFT KEYS.

→ See ***Program Load, Save, Delete, Etc.*** on page 117.

ROUTING Storage Press and hold down the PROGRAM key for one second to access this area. The LED next to the PROGRAM key blinks. Here you'll find utilities for loading, saving, or deleting "routing configurations."

→ See ***Signal Flow Example*** on page 66.

→ To change the "hold time," see ***Miscellaneous Setup Options*** on page 140.

SETUP Storage Press and hold down the PROGRAM key again for one second to access this area. The LED next to the PROGRAM key blinks. Inside you'll find utilities for loading, saving, or deleting "setup configurations."

→ See *Storing and Loading Setups* on page 139.

→ To change the "hold time," see *Miscellaneous Setup Options* on page 140.

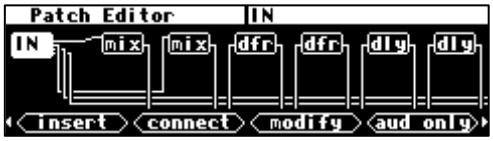
USERGROUPS Press and hold down the PROGRAM key again for one second to access this area. The LED next to the PROGRAM key blinks. Inside you'll find utilities for renaming or deleting "User Groups."

→ See *Using User Groups to Organize Useful Programs* on page 45.

PARAMETER Press the PARAMETER key to access this area. Here you'll find the parameters for the currently loaded programs. Continue pressing the PARAMETER key to access additional SOFT KEYS (if available).

→ See *Parameters* on page 133.

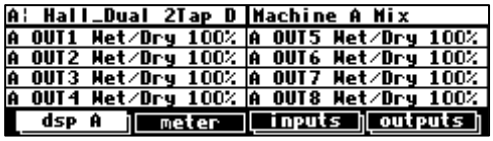
The PARAMETER key also gives access to the built-in Patch Editor. Press and hold down the PARAMETER key for one second to access this area. The LED next to the PARAMETER key blinks. The Patch Editor allows you to create your own effects from scratch or to customize programs that already exist.



→ See the separate Programmer's Manual for more information on the Patch Editor.

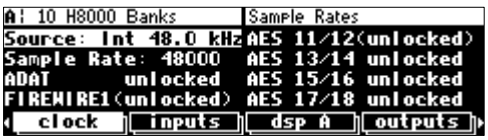
→ To change the "hold time," see *Miscellaneous Setup Options* on page 140.

LEVELS Press the LEVELS key to access this area. Inside you'll find level and Level Meter parameters.

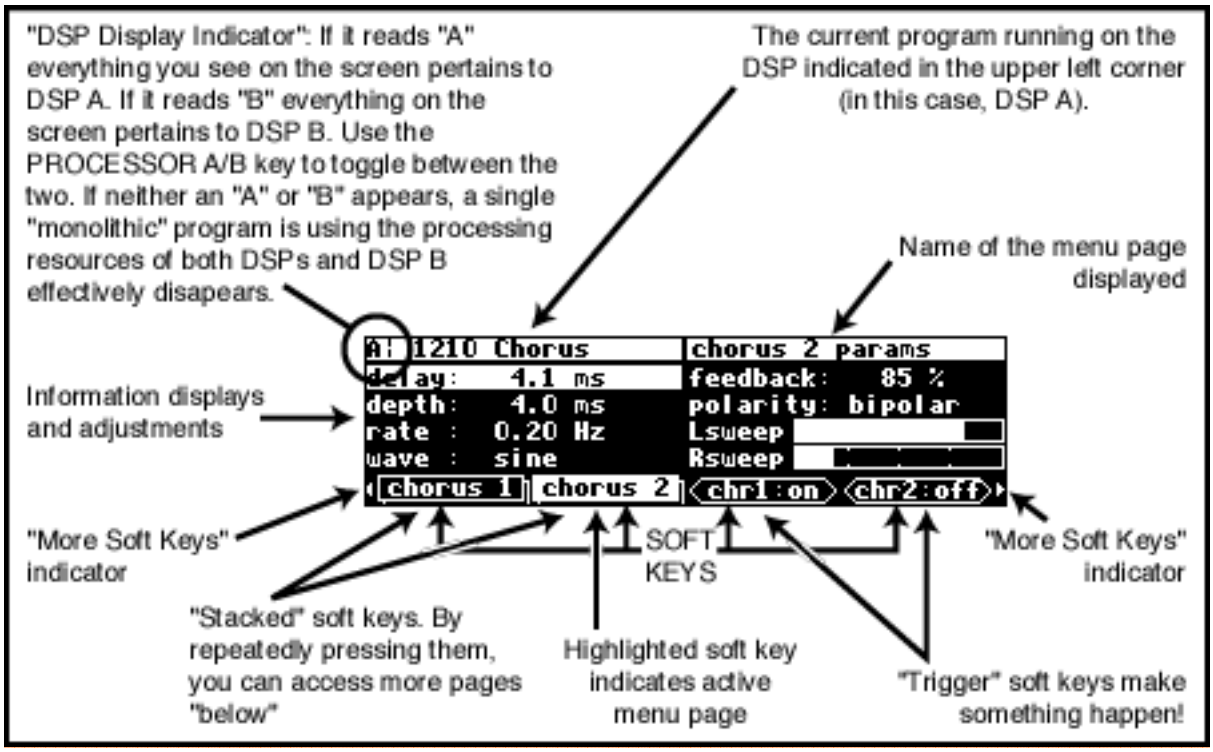


→ See *Controlling Levels* on page 74.

SETUP Press the SETUP key to access this global, "catch-all" area. Inside you'll find routing parameters, digital setup controls, global MIDI setup, global "external" setup, display contrast/brightness, the pedal jacks' setup, dump data utilities, next/previous program advance, and miscellaneous service utilities. Press the SETUP key more than once to access additional SOFT KEYS.



Every "area" in the H8000FW makes use of the display, so understanding the display is critical. A generic screen of the sort typically found in the PARAMETER area is shown below. It exemplifies various aspects of the display that remain constant no matter what area of the H8000FW you're in.



First, in the upper left-hand corner of the screen is either the letter "**A**," the letter "**B**," or the beginning of the program name This is the "DSP Display Indicator." If it reads "**A**," then everything else on a "DSP sensitive" screen is in reference to DSP A. If it reads "**B**," then everything else on a "DSP sensitive" display is in reference to DSP B. Press the PROCESSOR A/B key to toggle the display between the two DSPs. *The screens in the PROGRAM, PARAMETER, and Patch Editor are "DSP sensitive." Both DSPs are always running, but the display only shows the parameters for one of them at a time. The "DSP Display Indicator" lets you know which one you're modifying. Look to it often.*

If there is no "**A**" or "**B**" in the upper left-hand corner of the screen, the H8000FW is running a "monolithic program." Monolithic programs use the signal processing resources of both DSPs. They use the routings for DSP A. While a monolithic program is loaded, DSP B effectively disappears.

The remainder of the upper left-hand corner of the screen always shows the name of the program currently running on the DSP referred to by the "DSP Display Indicator." In

the example shown above, we're running a program "**1210 Chorus**" on DSP A. The upper right-hand corner of the screen always describes the menu page you're looking at. In the example shown above, we're looking at the "**chorus 2 params**" menu page.

Situated along the bottom of the display are the so-called "SOFT KEYS." The four physical keys located below the display select menu pages or events corresponding to these SOFT KEYS. (They're called "soft" because their function changes depending on context.) The "More Soft Keys" indicators are the little arrows next to the first and last SOFT KEYS. They indicate that if you press the "area" key you used to access the current display *again*, you will access *more* SOFT KEYS. The arrows are meant to imply that more pages exist in a nether-world beyond the display. . .

For example, press the SETUP key to see the "More Soft Keys" indicators.

Press the SETUP key again to get more SOFT KEYS.

Press the SETUP key a few more times to return to the original set of SOFT KEYS.

A "Stacked" SOFT KEY (shown on the **format** and **pedals** menu pages above) indicates that if you repeatedly press the "stacked" SOFT KEY, you will access more menus. The graphic is meant to imply that there are more pages lying "below" the "top" one.

For example, repeatedly press the SETUP key until you see the stacked SOFT KEY **midi**. Press **midi**.

Press it again to get a second menu page.

Press it again to get a third menu page.

Press it twice more to return to the original menu page.

Pressing a SOFT KEY repeatedly that is *not* stacked puts the H8000FW into "self-destruct" mode. Just kidding. It has no effect.

When you press a SOFT KEY, it becomes highlighted. The middle section of the screen is a menu page corresponding to that highlighted SOFT KEY. Use the cursor keys to "move around" on the menu page. Use the KNOB, the NUMERIC KEYPAD, and the SELECT key to change and enter values.

→ See *Using the Cursor Keys, the SELECT key, the NUMERIC KEYPAD, and the KNOB* on page 19.

Before moving on, we ought to say that not all SOFT KEYS are menu pages. Some SOFT KEYS are "triggers." A "trigger" is a key that *triggers* an event, get it? You'll always know the difference between menu page SOFT KEYS and trigger SOFT KEYS because *menu* page SOFT KEYS are rectangular, whereas *trigger* SOFT KEYS are hexagonal. On this screen **Operate** and **info** are menu pages, and **‹On/Off›** is a trigger.

Using the Cursor Keys, the SELECT key, the NUMERIC KEYPAD, and the KNOB

We use the CURSOR keys, the KNOB, the SELECT key, and the NUMERIC KEYPAD to navigate and manipulate the menu pages found in the PARAMETER, Patch Editor, LEVELS, BYPASS, and SETUP areas. We'll discuss their use in the PROGRAM and Routing Storage areas in a bit.

Use of the cursor keys is straightforward. The LEFT and RIGHT CURSOR keys move the cursor left and right, respectively. The UP and DOWN CURSOR keys move the cursor up and down, respectively. (Go figure...)

Use the KNOB, NUMERIC KEYPAD, or the ⇧/⇩ keys to alter the value of a numeric parameter. For example, spin the KNOB on this screen to change the value of **Mix** or enter a new value directly with the NUMERIC KEYPAD (pressing ENT when you're done).

Use the KNOB or the ⇧/⇩ keys to alter the value of a text parameter. For example, spin the KNOB or press the ⇧ key to change **Shape** from **Sine** to **Triangle** on this screen.

Numeric parameters and text parameters cover 99% of the parameters you'll see in the H8000FW, but there are a few more esoteric parameters you'll encounter. One such oddball is the "trigger" parameter. You place the cursor over a trigger parameter, and trigger it by pressing SELECT. It will trigger something (no doubt fascinating) to happen. Other oddballs include "Taps" and "Graphics."

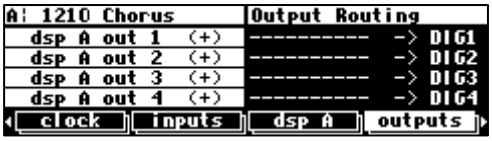
→ See ***System Tempo*** on page 134.

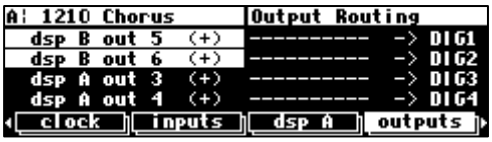
→ See ***Graphics and Curves*** on page 137.

→ The left and right cursor keys behave differently than you might expect in the PROGRAM area. Please see ***Loading Programs*** on page 38 for a brief introduction, and ***Loading Programs*** on page 125 for a more detailed discussion.

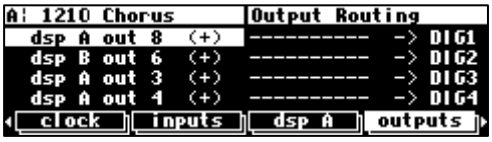
→ See ***wheel speed*** on page 140.

Ganged Parameters





In some cases there are multiple, related parameters that are usually adjusted together. To make such "mass adjustments" easy, a feature exists that *gangs* parameters together. The **outputs** menu page in the SETUP area contains a good example of ganged parameters. The purpose of this menu page is to assign signals to the AES/EBU digital outputs. Such assignments are typically made in quad or stereo gangs. So, all four parameters are initially ganged together. Spin the KNOB and all four values change.



Now, let's say you only want to change the assignments to **DIG1** and **DIG2**. Press the DOWN CURSOR key to "un-gang" **DIG3** and **DIG4**. Now spin the KNOB; only the values for **DIG1** and **DIG2** change.

Going further, let's say you only want to change the value of **DIG1**. Again, press the DOWN CURSOR key to "un-gang" **DIG2**. Now, spin the KNOB - only the value of **DIG1** changes. Press the DOWN CURSOR key repeatedly to cycle through the various gang possibilities: next **DIG2** alone is selected, then **DIG3** and **DIG4** are ganged together, then **DIG3** is alone, then **DIG4** is alone, and lastly we arrive at our starting point - all four parameters are ganged together. Gangs are much easier to use than to describe, so take a minute and play with the gangs on this menu page. You will find gangs sprinkled liberally throughout the H8000FW as their presence facilitates many tasks.

Entering or Changing Text

In some menus, it will be necessary to enter or change text. For example, you will often change text when saving a new program. The method by which this is done is straightforward, albeit a bit tedious. *To play along, go to the PROGRAM area and press the* ***‹Save as›*** *SOFT KEY. (You may have to press the PROGRAM key a second time to see it.) Move the cursor over the* ***rename*** *field and press SELECT.*

Here's how it works:

- The upper-left portion of the display contains the text that's being changed. Here we've entered "I Can Type Fas..." - we're not quite done.

- The CURSOR keys take you around the virtual keyboard.
- SELECT enters the currently selected letter (equivalent to actually pressing a key on a real keyboard).
- The ⇩ key toggles between "insert" and "overwrite" modes. Alternatively, you can place the cursor over **Ovr**/**Ins** and press SELECT.
- The KNOB moves the insert/overwrite point on the top row.
- The ⇧ key toggles between capital and lower-case letters and gives you access to very special characters such as "**!**", "**@**", and "**&**". Alternatively, you can place the cursor over **Caps** and press SELECT.

- The numeric keypad enters numbers, a decimal point, or a minus sign.
- CXL will delete the current character.

When you are finished naming the thing that needed naming, place the cursor over **Enter** and press SELECT (or use the ENT key on the keypad). If you change your mind and don't want to name the thing that you thought needed naming, place the cursor over **Quit** and press SELECT.

QuickStart Or "Nearly Instant Gratification"

All right, all right! Areas, displays, SOFT KEYS, parameter this, scroll that. . . BUT WHAT CAN IT DO? Let's cut to the chase and get you up and running! Besides, if you played with the box a good deal before moving on to the finer points of operation, those finer points will stick better to the ol' gray matter. . .

Here are the steps we will take:

First, we'll connect the H8000FW to the rest of your gear.

- On page 25, we'll route signals between all of those inputs, outputs, and DSPs you've been reading so much about.
- On page 37, we'll set the input levels so that things don't distort.
- On page 38, we'll learn how to "mute" the H8000FW in the event of feedback.

- On page 41, we'll run programs on DSP A and DSP B and we'll run "monolithic programs." Moreover, we'll "tweak" their parameters.
- Finally, on page 44, we'll learn how to save the programs you've "tweaked" for future use.

HOOKING UP AND INTERNAL ROUTING

Before we concentrate on what happens *inside* the H8000FW, we ought to get it hooked up to the rest of your rack.

→ See *The Back Panel* on page 9 for information on the jack types and their specifications.

Hook up the analog inputs to suitable output sources, such as an analog mixer's effect sends or the outputs of a preamplifier. The connections may be made with either balanced XLR connectors or unbalanced 1/4" connectors. You can plug a guitar into the 1/4" jacks, but you will need to turn up the input gain. This happens at the "bottom" **inputs** menu page in the LEVELS area.

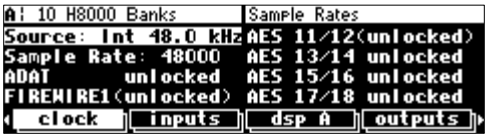
→ See *Setting Input Levels* on page 37.

- Hook up the balanced analog outputs to suitable input recipients, such as an analog mixer or an amplifier.
- Hook up the AES/EBU, S/P DIF, and/or ADAT digital inputs to suitable output sources, such as a computer interface or a keyboard with digital outputs.
- Hook up the digital outputs to suitable input recipients, such as a computer interface or a sampler.

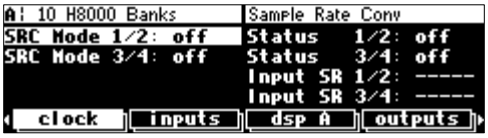
You can specify whether the S/P DIF and AES/EBU 1/2 output signal uses the "consumer" or "professional" protocol at the "second" **format** menu page in the SETUP area. To select the "consumer" protocol set **DOUT 1/2** to **S/P DIF**. To select the "professional" protocol set **DOUT 1/2** to **AES/EBU**. *(H8000 display shown; H8000FW is slightly different.)*

To be clear, the signal assigned to digital outputs 1/2 will come out *both* the AES/EBU 1/2 port and the S/P DIF port regardless of your choice. Your choice simply defines the digital *protocol* the signal will use. Both AES/EBU 1/2 and S/P DIF use the *same* protocol as defined on this menu page. Use the professional (AES/EBU) protocol unless you have

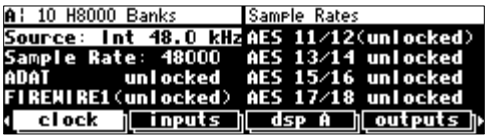
a compelling reason to do otherwise ... you are a professional, aren't you ? Eventide does not recommend the use of S/P DIF above 48kHz sampling.



Unless you're *only* using the analog inputs and outputs, you'll need to make sure all of the digital devices in your studio or rack are slaved to the same clock source. The H8000FW can generate its own clock at 44.1kHz, 48kHz, 88.2kHz, or 96kHz as selected by **Source** on the **clock** menu page in the SETUP area.



If you use the H8000FW's internal clock, be sure that the digital devices that are connected to it derive their clock signals from the H8000FW. If you are unable to synchronize AES/EBU inputs 1-4 or S/P DIF inputs 1/2, turn on the H8000FW's sample rate conversion (**SRC**) algorithm on the "second" and "third" **clock** menu pages in the SETUP area. The H8000FW does not have sample rate conversion for AES11-18 or the ADAT inputs.



Depending on the particulars of your digital setup, you may wish to slave the H8000FW to another device. The H8000FW can slave to the S/P DIF 3/4 input, the AES/EBU inputs 11/12, 13/14, 15/16, 17/18, or the ADAT and FireWire inputs as well as a Wordclock signal. These are selected by **Source** on the **clock** menu page in the SETUP area. Note that the H8000FW cannot slave to AES/EBU inputs 1-4 or S/P DIF 1/2.

→ To read about the digital setup in more detail, see *Digital Setup* on page 80.

Things to Know about Routing

When you are ready, see *The Comprehensive Input / Output Scheme* for more details. Until then …

- The effects engine (the DSP section) of the H8000FW has eight inputs and outputs
- Only 8 inputs can be connected to the effects engine
- Only 8 outputs can be connected from the effects engine
- The analog inputs can only be used as input channels 1-4 (7-8 on H8000)
- The analog outputs are always connected as output channels 1-4 (7-8 on H8000)
- The AES XLR inputs can only be used as input channels 5-8 (1-8 on H8000)
- The AES XLR outputs are always connected as output channels 5-8 (1-8 on H8000)
- S/P DIF 1/2 in can replace AES 1/2 in
- S/P DIF 1/2 out is driven with the same signal as AES 1/2 out
- ADAT out can be fed from the effects engine or from the ADAT inputs
- In addition, for the H8000FW
- S/P DIF 3/4 in can replace AES 11/12 in
- S/P DIF 3/4 out is driven with the same signal as AES 11/12 out
- ADAT1-8 out can be fed from the effects engine or from the ADAT, AES11-18 or FireWire inputs
- AES11-18 out can be fed from the effects engine or from the ADAT, AES11-18 or FireWire inputs
- FireWire outputs can be fed from the effects engine or from the ADAT or AES11-18 inputs
- FireWire outputs can not be fed directly from FireWire inputs

LOADING ROUTING CONFIGURATIONS

As was stated in the Overview, the H8000FW houses two separate DSP engines. DSP A is always running a program and DSP B is always running another program *or* they "combine their forces" to run one large program (monolithic mode). When using both processors separately, the program running on DSP A does not necessarily have anything to do with the program running on DSP B, and the program running on DSP B does not necessarily have anything to do with the program running on DSP A! (The display can only show the parameters for one of them at a time - use the PROCESSOR A/B key to toggle between displays.)

When running "monolithic" programs, DSP B effectively disappears. The monolithic program uses the routing configuration for DSP A. When you are done with the monolithic program and load DSP-specific program, DSP B's previous routings will be restored - it will "reappear." You can identify monolithic programs in the PROGRAM area by a Roman Numeral "II" next to their name (e.g., **DynoMyPiano_Ambience** and **Piano & Vocal Halls** in this screen shot).

While the functioning of DSP A is quite independent of DSP B and vice versa, we can *route* signals between them. Each DSP can accept eight input signals and produce eight output signals. The signal routing between the various ins and outs and the two DSPs is comprehensive and can be manually configured in just about any way imaginable. However, for the purposes of this "Instant Gratification" section, we'll stick to a sample of the routing configurations that come as presets in the H8000FW. (Besides, you'll probably use these preset configurations most of the time because they cover the most obvious and necessary routing configurations.)

→ To learn how to manually configure the routing configuration, see ***The Comprehensive Input / Output Scheme*** on page 51.

To access the preset routing configurations, press and hold down the PROGRAM key for one second to enter the Routing Storage area. The LED next to the PROGRAM key will begin to blink and the upper right-hand corner of the display will read "**Routings**." Use the UP and DOWN CURSOR keys to place the cursor over the routing configuration you would like to load and then press SELECT. Below, we describe many of the preset routing configurations in English and complement that description with a block diagram. The routing configuration "name" as saved in the H8000FW precedes each description.

→ To change the "one second hold time," see ***Miscellaneous Setup Options*** on page 140.

For a simple Analog in Analog out routing, load "**Analog A->B**." The remainder of the routing configurations will be discussed in the next section.

FACTORY ROUTING CONFIGURATIONS

Notes on the following configurations:

- The *input block* and *output block* shown below are just "binding posts" to connect to – they don't change the signal.
- References to AES11-18, SPDIF3/4 and FIREWIRE in the following text only apply to the H8000FW.
- In most of the following routings ADAT **out**, AES11-18 **out** and FIREWIRE1 **out** are also all connected in parallel to the output block – the outputs shown in the diagram vary with the function of the routing, but all the above are connected.
- FIREWIRE2 **in** and **out** are not used in most of these routings.
- SPDIF1/2 **in** may be used in place of AES1/2 by setting the **DIN 1/2** control appropriately.

See ***DIN 1/2 allows the selection of either AES/EBU or S/P DIF*** *on page 63.*

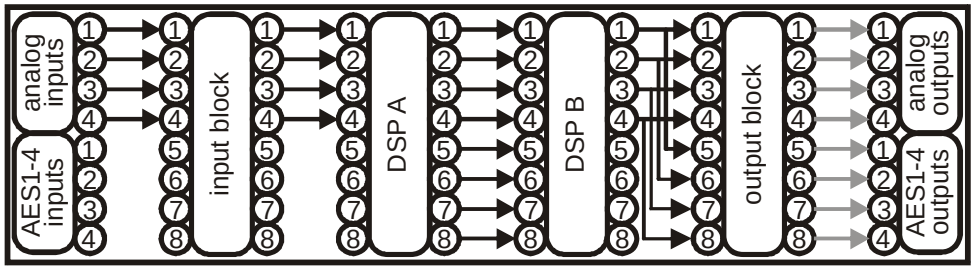
- SPDIF3/4 **in** may be used in place of AES11/12 by setting the **DIN 11/12** control appropriately. You should use SPDIF3/4 rather than SPDIF 1/2 if you want to sync to it or use it at 96kHz.

See **DIN 11/12 allows the choice of either AES/EBU or S/P DIF for AES11/12. (H8000FW only)** *on pag 63.*

4 Channel series Routings

With a series routing, the signal goes into DSP A and has an effect added, then the effected signal goes to machine B, where another effect is added, both to the original signal and also the effect from DSP A. This is useful if DSP A is, say, a coloration and DSP B is a reverb, but may be less appropriate if they are, say, both pitch shifters as the shifted signal from A will be shifted again by B.

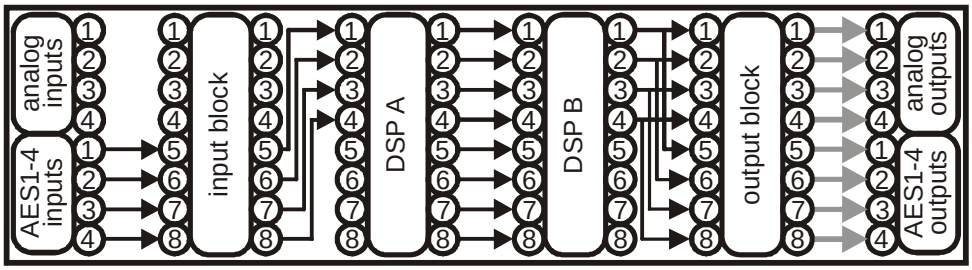
"Analog A->B"



All four analog inputs go into DSP A, the output from DSP A goes into DSP B, the output from DSP B goes into both the analog outputs and AES 1-4.

"AES4 A->B"

All four AES1-4 inputs go into DSP A. The outputs from DSP A go into DSP B, the outputs from DSP B feed both the analog outputs and the digital outputs.

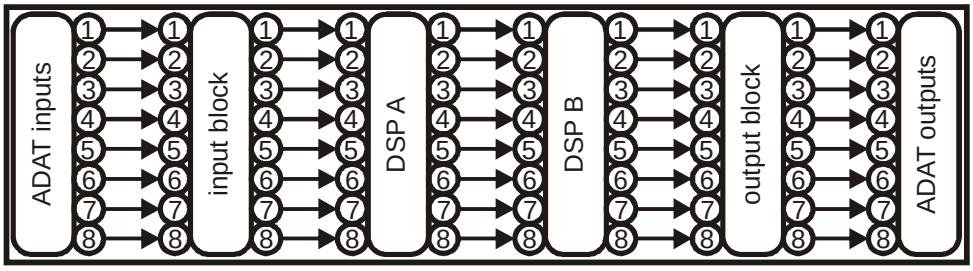


8 Channel series Routings

All the following routings take 8 inputs and pass them through DSP A, then DSP B and then feed the outputs via the "output block." Again, all of the analog, AES1-4, AES11-18, ADAT and FIREWIRE1 outputs are connected in parallel to the output block, even though for clarity only one set of outputs is shown.

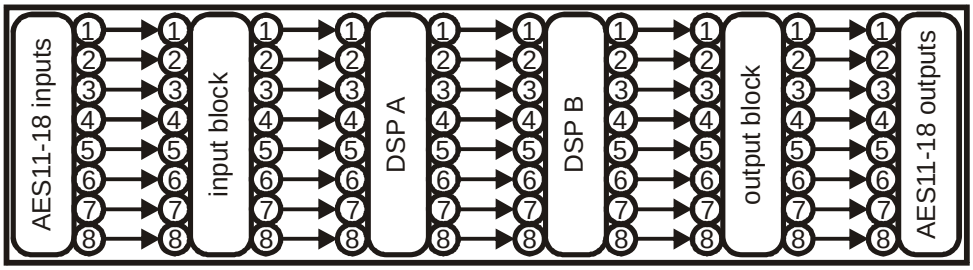
"ADAT A->B"

All eight ADAT inputs go into DSP A. The outputs from DSP A go into DSP B. The outputs from DSP B go to the output block, feeding the outputs.



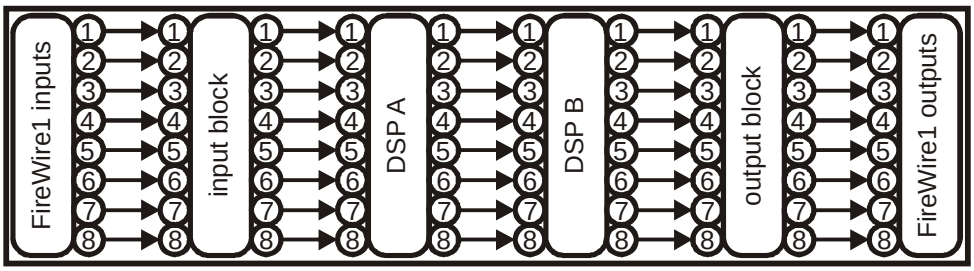
"AES8 A->B"

All AES11-18 inputs go into DSP A. The outputs from DSP A go into DSP B. The outputs from DSP B go to the output block, feeding the outputs.



"FireWire1 A->B"

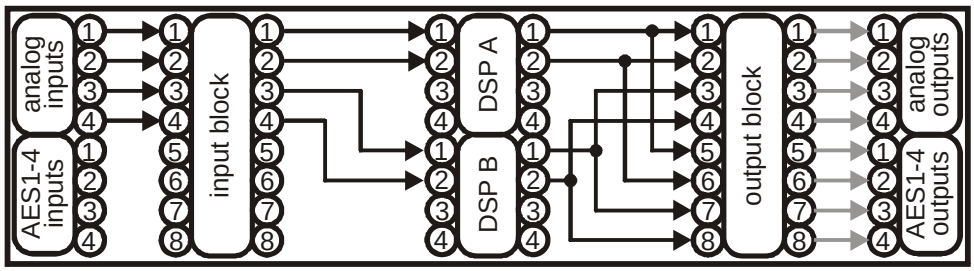
All FireWire1 inputs go into DSP A. The outputs from DSP A go into DSP B. The outputs from DSP B go to the output block, feeding the outputs.



Stereo Dual Machine Routings

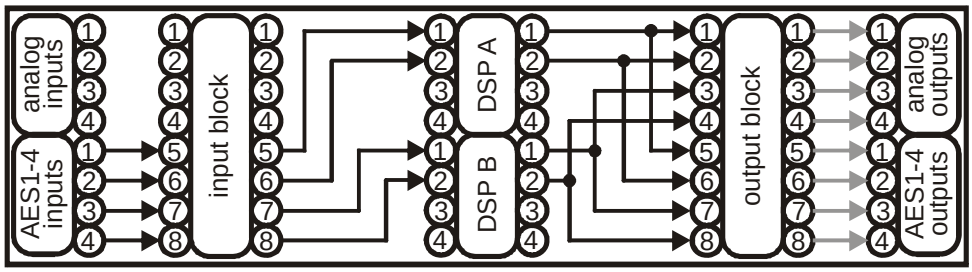
The following routings configure the H8000FW as two separate stereo units.

"Analog Dual Stereo"



Analog inputs 1&2 are sent to DSP A, the output of which is sent to the first two analog and digital outputs. Analog inputs 3&4 are sent to DSP B, the output of which is sent to analog and digital outputs 3&4.

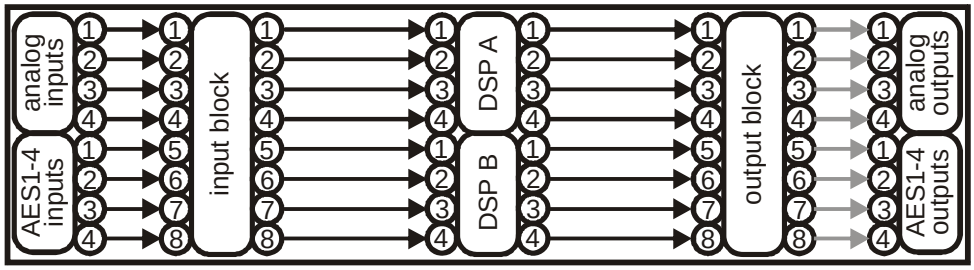
"AES4 Dual Stereo"



AES/EBU inputs 1&2 are sent to DSP A, the output of which is sent to the first two analog and digital outputs. AES/EBU inputs 3&4 are sent to DSP B, the output of which is sent to analog and digital outputs 3&4.

The following routings configure the H8000FW as two separate 4 channel units. If a dual stereo preset, e.g. "1030 2 Stereo Verbs" is loaded in each DSP, this will give 4 independent effects.

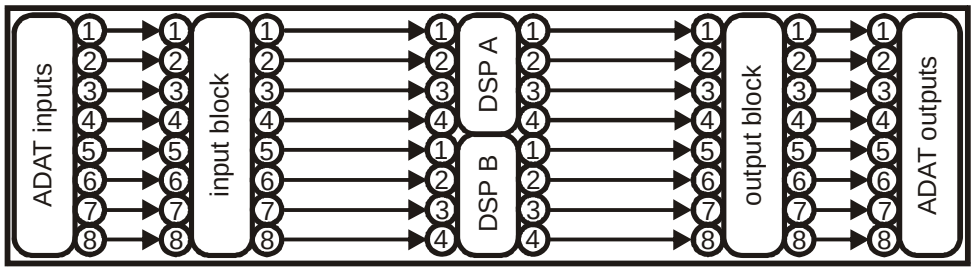
"Analog&AES 8 Track A,B"



The four analog inputs and outputs use DSP A. The four AES1-4 inputs and outputs use DSP B.

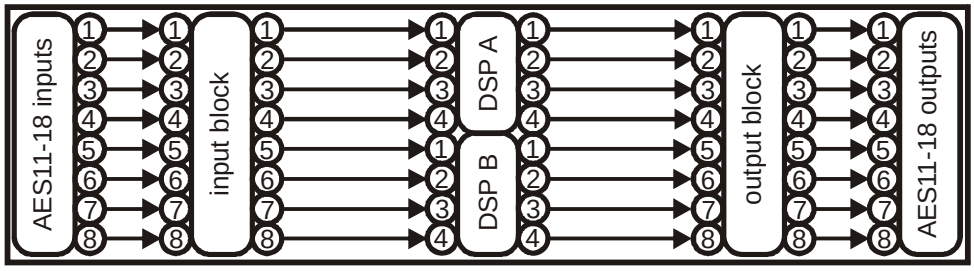
"ADAT 8 Track A,B"

The first four ADAT inputs go into DSP A, out from DSP A into the first four ADAT outputs.



The last four ADAT inputs go into DSP B, out from DSP B into the last four ADAT outputs.

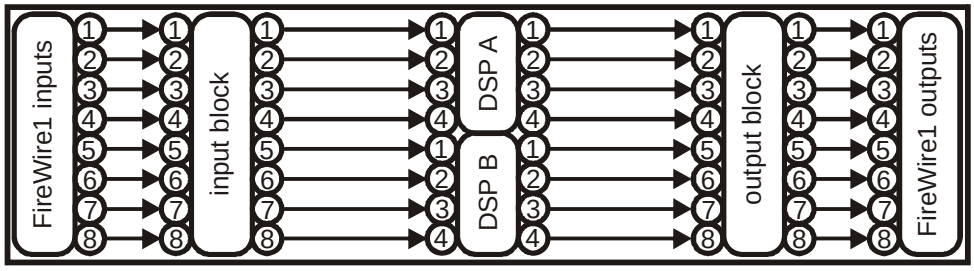
AES8 8 Track A,B"



AES11-14 inputs go into DSP A, out from DSP A to the analog outputs and the AES11-14 outputs.

The AES15-18 inputs go into DSP B, out from DSP B into the AES15-18 outputs.

FireWire 8 Track A,B"



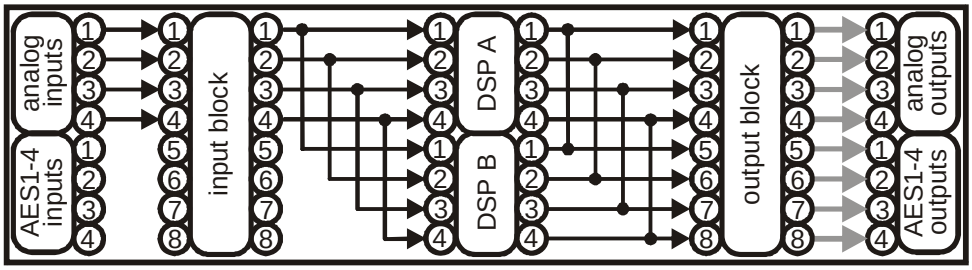
FireWire1 1-4 inputs go into DSP A, out from DSP A to the analog outputs and the FireWire1 1-4 outputs.

The FireWire1 5-8 inputs go into DSP B, out from DSP B into the FireWire1 5-8 outputs.

4 Channel parallel routings

In a parallel routing, each DSP has the same inputs and the outputs of each are mixed. This gives two discrete effects, unlike a series configuration where the effect from the second DSP is added to the effected signal from the first.

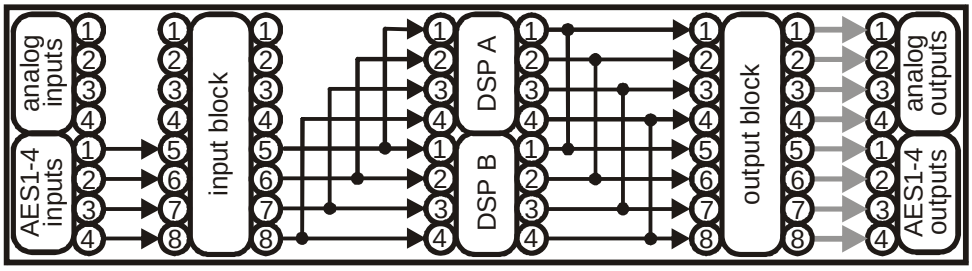
"Analog A||B"



All four analog inputs get sent to both DSPs.

The first four outputs of each DSP are summed before being sent to the analog and AES1-4 outputs.

"AES4 A || B"

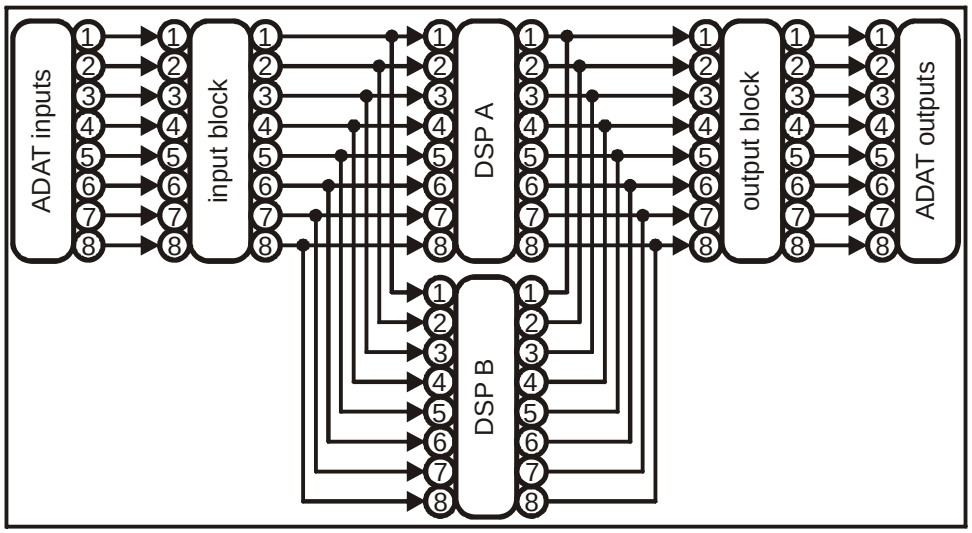


All four AES1-4 inputs get sent to both DSPs.

The first four outputs of each DSP are summed before being sent to the analog and AES1-4 outputs.

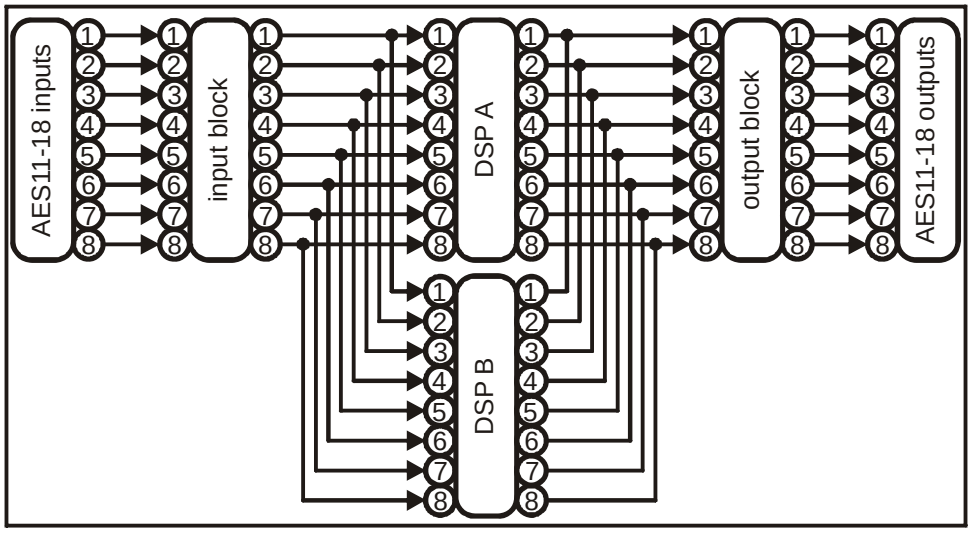
"ADAT A || B"

All eight ADAT inputs go into DSP A and DSP B, all eight outputs from both DSP A and DSP B are summed at the output block.



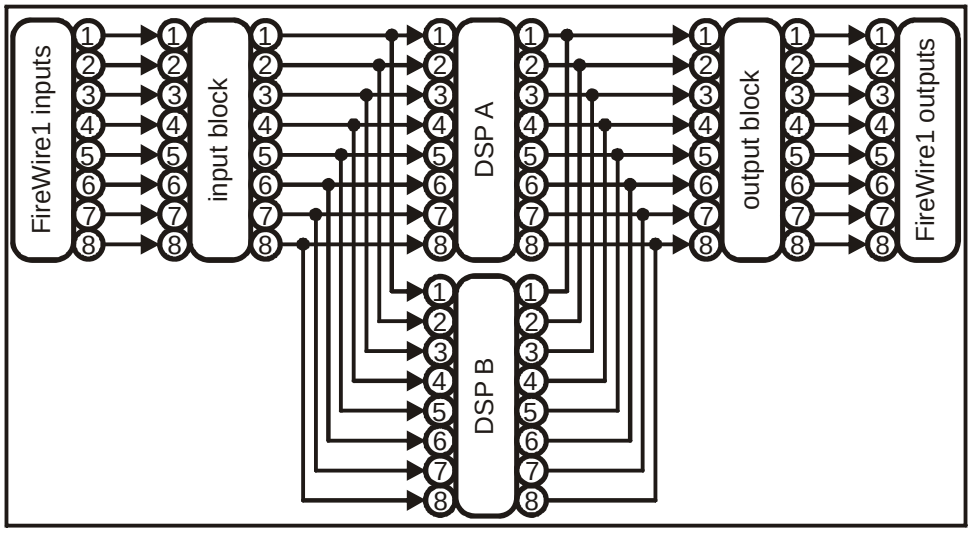
"AES8 A || B"

All AES11-18 inputs go into DSP A and DSP B, all eight outputs from both DSP A and DSP B are summed at the output block.



"FIREWIRE A || B"

All eight FIREWIRE1 inputs go into DSP A and DSP B, all eight outputs from both DSP A and DSP B are summed at the output block.



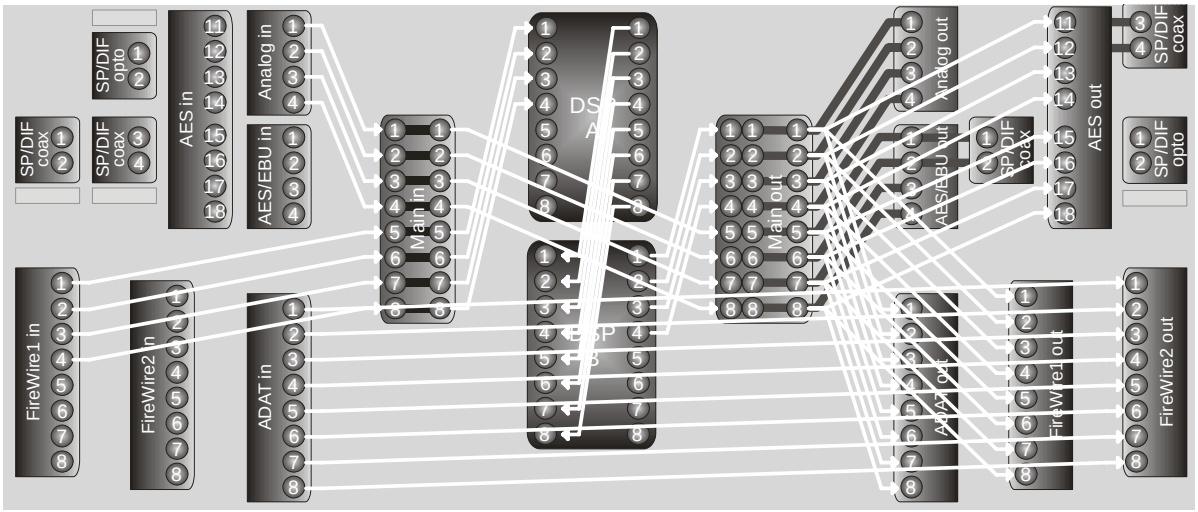
Complex FireWire Routings

These are for use with workstation software on a PC or Mac.

Analog & FireWire AB

Four channels are sent from the workstation over FireWire1 1-4 and pass through DSP A, then DSP B and are then sent out on FireWire1 1-4. The four analog inputs are sent over FireWire1 5-8. In addition, the 8 ADAT input channels are sent out over FireWire2.

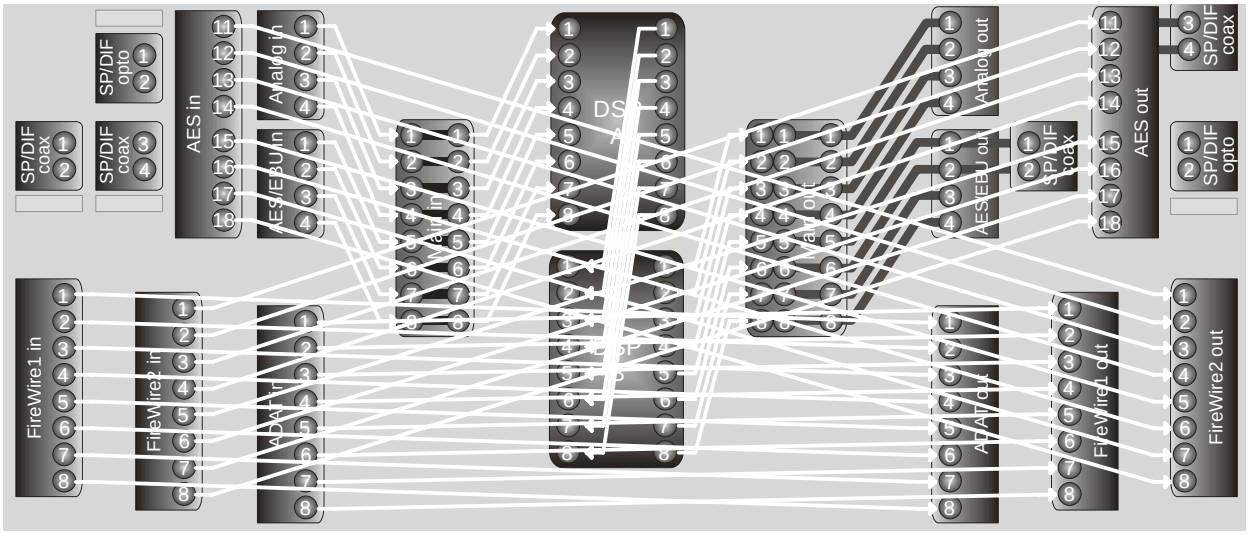
Thus the H8000FW is used as a 4 channel A/D and also provides two 4 channel effects (which would typically be used as an insert) as well as an 8 channel ADAT input feed.



ADAT & AES8 I/O

There is a lot going on here. FireWire1 in is connected to ADAT out, ADAT in is connected to FireWire1 out, AES 11-18 in are connected to FireWire2 out, while FireWire2 in is connected to AES 11-18 out. In addition, DSP A and B are fed in series from the analog and AES4 inputs.

So, the H8000FW is performing the role of an 8 channel dual machine effects unit, while at the same time it is offering 32 channels of I/O to the workstation.



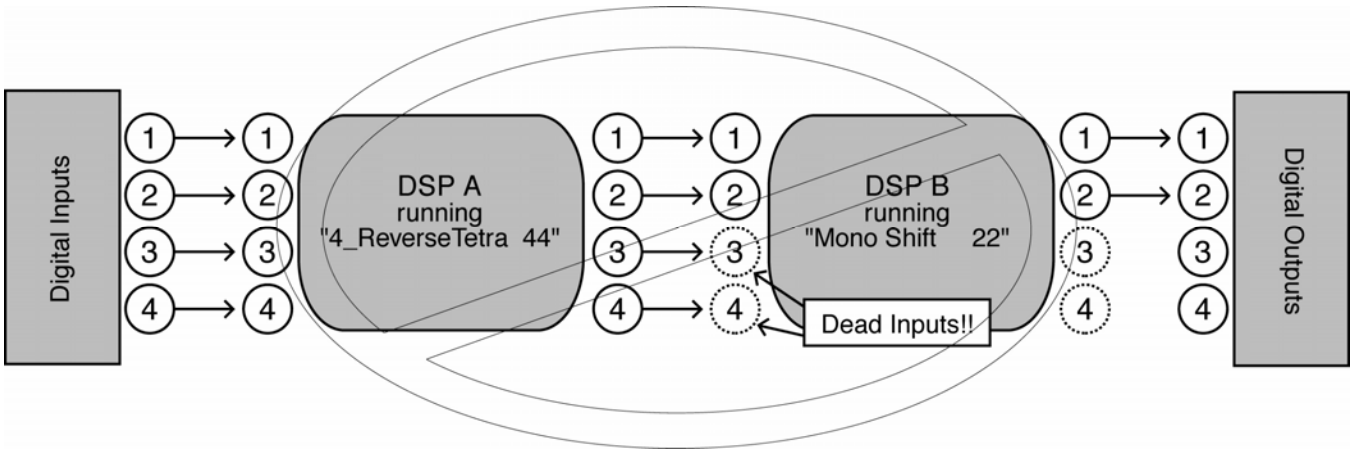
The I/O Identifier

While each DSP has eight inputs and eight outputs, it's not necessarily the case that every program will utilize all eight inputs or all eight outputs of the DSP it's running on. Every program is unique and uses only the number of inputs and outputs that are necessary for its function. For instance, a program that synthesized sound would not need any inputs! A program that modulated one stereo signal with another would need four inputs (two for the carrier and two for the modulator) but only two outputs (for the result of the modulation). Again, the function of a program determines how many inputs and outputs are utilized on the DSP running the program.

Notice that to the right of every program name in the PROGRAM area is a two-digit number (press the PROGRAM key to get there). This two-digit number is known as the "I/O Identifier." In the case of the program "**BasicRoom**" shown to the right, the two digit number is "**24**." In the case of the program "**Compressor_8**" shown to the right, the two-digit number is "**88**." The first digit indicates how many inputs are utilized, and the second digit indicates how many outputs are utilized. If the "I/O Identifier" for a program were "**13**," DSP input 1 would be used while inputs 2 through 8 were dead, and DSP outputs 1, 2, and 3 would be used while outputs 4 through 8 were dead. A program will utilize the same number of inputs and outputs regardless of whether it is loaded on DSP A or DSP B.

→A small number of programs have no I/O identifier. See .

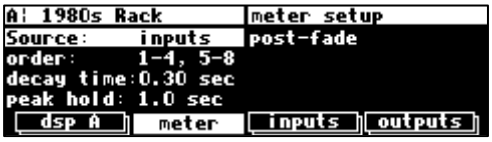
If the I/O Identifier is not visible on page 71 for more information.



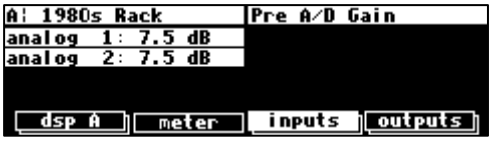
Those DSP inputs or outputs that are *not* used by the program are "dead" - no signals are passed by them. Knowing which inputs and outputs a program uses can affect which routing configuration you choose to use. You probably wouldn't want to place a program that only utilized two inputs after a program that utilized four outputs because two of those outputs would be connected to "dead" inputs. *(Of course, it wouldn't hurt anything if you did, but the signals at the two outputs connected to "dead" inputs would be "lost.")* This scenario is depicted in the diagram above.

It's important for you to think about which inputs and which outputs from DSP A and DSP B are "dead" in the context of the routing configuration you've chosen. Nevertheless, things usually work out more easily than this brief warning might cause you to believe!

→ For more information on this topic, including examples, see ***Programs' Effect on Routing Decisions*** on page 71.



As we're sure you know, getting a high, but not distorted, signal at every point in a signal path is essential. The Level Meters help us to achieve this goal. In the LEVELS area go to the **meter** menu page to reach this screen. Adjust **Source** (with the KNOB or the INC/DEC keys) to **inputs**. The eight Level Meters now reflect input levels of the signals defined on the **inputs** menu pages in the SETUP area.



In this cursory introduction, we only fiddle with the levels at the inputs but, rest assured, you can change levels almost anywhere in the signal path.

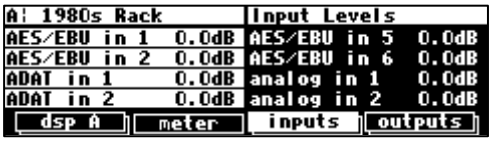
→ See:

Controlling the Level of the Analog and Digital Inputs on page 75.

Input Levels, Wet/Dry Ratios, and Output Levels for Each DSP on page 77.

Controlling the Level of the Analog and Digital Outputs on page 78.

Of course, it's always best to optimize levels at their source (leaving the H8000FW's boost/cut at 0dB). But if you can't, then go to the **inputs** menu page in the LEVELS area. If you're using the analog inputs, press it twice so that only the analog input levels are shown. Here you can boost/cut the analog inputs by +30dB/-90dB before they are digitally converted - setting the gain before the converters gives the best characteristics. *(H8000 menu page shown, H8000FW has adjustments for all four analog inputs.)*

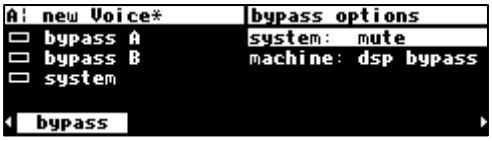


You can cut the analog inputs after digital conversion and the digital inputs by 0db/-100dB on the first **inputs** page *(this screen will may look different depending on your routing configuration and will definitely look different if you have an H8000FW)*. Assuming you set the **Source** of the Level Meters to **inputs** on the **meter** menu page in the LEVELS area, the meters reflect the input levels after the boost/cut is applied. You want the loudest portions of the signal to approach, but not reach, the red "clip" LED at the top of the Level Meters. If you do clip a signal, you won't hurt the H8000FW, but you may hurt your chances for career advancement - a clipped signal typically sounds nasty.

→ For more information on setting input levels see ***Controlling the Level of the Analog and Digital Inputs*** on page 75.

"The effect on your affect of the H8000FW's effects will positively affect your popularity."
-Anonymous

"Panic" Muting



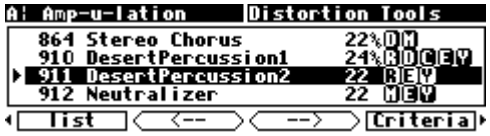
In a moment you'll be loading and playing with programs, but before you do let it be said that the H8000FW can produce LOUD sounds with very little warning in some of the programs in some situations. It would be nice to have a "panic" key to press in such a situation. Let's arrange things so that pressing the BYPASS key mutes all of the H8000FW's outputs. Go to the **bypass** menu in the LEVELS area (you may have to press the LEVELS key a few times to see it). Change the value of the **system** parameter to **mute** as shown above (with the KNOB or the INC/DEC keys). Now, press the BYPASS key. The A and B LEDs begin to blink - you've muted the H8000FW. To un-mute, press the BYPASS key again.

→ For more information see *Bypassing and Muting* on page 92.

Loading Programs

Assuming you've loaded an appropriate routing configuration, the H8000FW should be ready to process! All that remains is to load a monolithic program *or* to load a program into each DSP.
To load a program, enter the PROGRAM area. The two "normal" menu pages you immediately find here, **list** and **Criteria**, work together to give you access to the H8000FW's hundreds of programs in a way that suits your needs. In this section, we'll only focus on two parameters on the **Criteria** menu page, **Sort By** and **Search By**. Of the two, **Search By** is the most important parameter to understand.

→ The remaining parameters are discussed in *Loading Programs* on page 38.



You will see that each program has a three- or four-digit number and a name. The program number has two parts - the last two digits are a number between 0 and 99, the remaining digits are the *bank* number. The bank is a loose grouping of related programs, whose name appears briefly at the top right of the screen when a program is selected by moving onto it. The screen on the right shows that the selected program is part of a bank of "Distortion Tools."

Let's go through an example. Say you want to use a delay-based program. First, go to the **Criteria** menu page in the PROGRAM area and set **Search By** to **Effect** and **Sort By** to **Number**.

Then, go to the **list** menu page. The **‹ - -** and **- - ›** SOFT KEYS search through programs as defined by **Search By** on the **Criteria** menu page. Since we opted to **Search By Effect**s, the **‹ - -** and **- - ›** SOFT KEYS search through all of the available programs to find those that contain certain types of **Effect**s:

- Samplers (**S**)
- Pitch shifters (**P**)
- Reverbs (**R**)
- Delays (**D**)
- Modulations (**M**)
- Complex Effects (**C**)
- Equalizers or Filters (**E**)
- dYnamics (**Y**)

You'll know which set of effects is currently displayed by the information provided in the upper right-hand corner of the screen. In this example, the set contains **35** programs that use **Dynamics** (compressors, gates, etc.). Notice that all of the programs shown have a "**Y**" icon to the right of their name, indicating that they perform dynamics processing, among other things.

Press the **‹ - -** or **- - ›** SOFT KEYS until you see the set of programs that contain delays. Notice that all of the programs shown have a "**D**" icon to the right of their name, indicating that they perform delay processing, among other things.

Now, you can use the left and right CURSOR keys (*not* the SOFT KEYS we've been discussing!) to jump through the programs by "century." Pressing the right CURSOR key from the screen above jumps *from* program numbers that start with 2*xx* to programs that start with 3*xx*, as shown here! Pressing it again would jump to programs with numbers *4xx*. You will recall that the first one or two digits form the bank number, so using these keys will jump from bank to bank.

Use the KNOB or the up and down CURSOR keys to move the highlighted section of the screen up or down.

Press the SELECT key to load the highlighted program. Once you do, the H8000FW moves you to the PARAMETER area so you can tweak the program. Notice that **8 Diatonicshifts** is now the currently loaded program!

Back in the PROGRAM area, you can also **Search By Source**, where **Source** refers to the type of input the program was designed for. The "searchable" sources are:

- Guitar Vocals
- Drums Keyboard
- Special FX Surround

Press the ‹ - - or - - › SOFT KEYS to flip through programs designed for these different **Source**s. Here we see **50** programs that were designed for use with **Drums**. The CURSOR keys and the KNOB behave just as they did when we **Search**ed **By Effect**s.

You can also **Search By Src+FX**.

In this mode, the ‹ - - SOFT KEY flips through the different sources (here we see programs designed for use with **Gtr**). The - - › SOFT KEY flips through the different effect types (here we see programs that use a **Dly** algorithm).

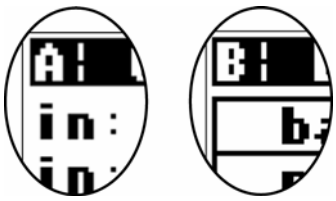
If you **Sort By Name**, as shown here, the programs are no longer displayed in numerical order, but rather are displayed in alphabetical order.

See? Alphabetical order! Now, pressing the left or right CURSOR keys jumps through the alphabet. Pressing the right CURSOR key here would cause us to jump to **Reverb** programs that begin with "**C**".

The "Speed" indicator (a little $^{9}_{6}$) indicates that this program can be loaded and run for use at 88.2kHz and 96kHz sampling rates. In the screen shown to the right, only **Basilica** could not be run at higher sampling rates because it does not have the "Speed" indicator.

→ See *Sampling Rates* on page 81 for more information.

The "monolithic" indicator (a Roman Numeral II) indicates that this program uses the processing resources of both DSP A and DSP B. In the screen shown to the right, the program **Dtune_VDly_Hall_EQ** is a monolithic program. Note the "II" next to its name. Think of monolithic programs as loading into DSP A and causing DSP B to disappear.



Any "non-monolithic" program that you SELECT will load into the currently displayed DSP (referred to by the letter in the upper left-hand corner of the screen). If you want to load the program into the DSP *not* currently displayed, press the PROCESSOR A/B key. Doing so will toggle the display to the other DSP.

Parameters

Simply loading programs probably won't prove satisfying for too long; you'll want to mess with the parameters on the programs you load. This is accomplished in the PARAMETER area. Very

little can be said generally about what you'll find in the PARAMETER area because every program in the H8000FW is a unique "algorithm." Each unique algorithm (i.e., program) calls for its own unique parameters.

→ To learn more about the "algorithmic" nature of the H8000FW's programs, read the separate Programmer's Manual.

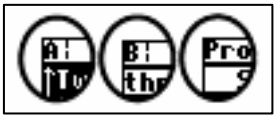
A huge number of the H8000FW's LFO's, delay times, reverb decays, etc., are designed to synch to a *system tempo* defined on the **tempo** menu page in the SETUP area. Say you're working on a song that's at 130 BPM. Simply set the system tempo to **130** and most of the H8000FW's LFO's delay times will be appropriate for the song. No more calculators. You can also derive the system tempo from a MIDIclock signal applied to the H8000FW's MIDI input. Simply set **Source** to **Midiclock**.

Parameters that synch to the system tempo are identified by "**t_**" such as "**t_rate**" and "**t_fmrate**" and are adjusted in musical terms such as "**whole note**" and "**dot 1/8**." You will find them in the PARAMETER area of most programs.

→ See *System Tempo* on page 134

→ Some parameters, such as delay loops, use the system timer. They are also denoted by "t_". See *System Timer* on page 135.

You will *usually* find an **info** or **about** menu page in the PARAMETER area. In it, you will find general information about what the program does along with any notes concerning special parameters or "non-obvious things."



The parameters displayed in the PARAMETER area pertain to the program running on the currently displayed DSP. That might be DSP A, DSP B, or neither if the H8000FW is running a monolithic program. The letter in the upper left-hand corner of the display indicates which is the case. If the program name is displayed without **A:** or **B:**, the program is monolithic. Assuming you're not running a monolithic program, to fiddle with the parameters for the program running on the DSP *not* currently displayed, press the PROCESSOR A/B key. Doing so will toggle the display to the DSP you want.

For example, here we're adjusting parameters for the program "**1980s Rack**" that is loaded on DSP A.

Pressing the PROCESSOR A/B key toggles the display from parameters for the program running on DSP A to parameters for the program running on DSP B. After pressing the PROCESSOR A/B key, we get the screen to the right. Now, we can adjust parameters for the program "**Whirly Mellow**" that is loaded on DSP B.

If you load a monolithic program, pressing the PROCESSOR A/B key has no effect because monolithic programs use the resources of both DSPs. Monolithic programs make DSP B effectively disappear.

Many, but by no means all, of the programs in the H8000FW currently support an "expert mode" feature. The **expert mode** parameter controlling this feature is found on the **misc** menu page in the SETUP area (you may have to press the SETUP key a few times to find it).

A setting of **0** *hides* all but the most relevant menu pages in the PARAMETER area. Conversely, a setting of **9** *reveals* all of the available menu pages in the PARAMETER area. Settings between **0** and **9** reveal an increasing number of menu pages in the PARAMETER area. Leave **expert mode** at **9** if you like lots of parameters to tinker with, at **0** if you find lots of parameters annoying, or somewhere in-between if your tastes fall somewhere in-between.

→ See *Miscellaneous Setup Options* on page 140 for information on the other keys on this screen.

It should also be mentioned that any parameter on any menu page can be "remote controlled" via MIDI or the rear foot pedal jacks. Telling you how to do this entails discussing voluminous topics, such as setting up MIDI globals, setting up foot pedal globals, and navigating a "remote control" menu page. Such a discussion wouldn't be in keeping with the concept of this ***Quick*start** section.

→ If this really piques your interest, go ahead and read:

Setting Up the External Controllers on page 94.

External Modulation and Trigger Menu Pages on page 98.

Remote Controlling Parameters on page 113.

"Tweaking" and Saving "Tweaks"

Different sets of parameter values for a single program are said to be different "tweaks" of that program. As you play with the parameters on the preset programs, you are "tweaking" those preset programs. For instance, let's say you want a program that mimics the frequency response of your neighbor's television as heard through *your* wall. You want to "tweak" the parameters of a filter program in order to get the correct frequency response.

First, load the program "**Filter_Q**."

Do some long calculations involving transmission coefficients and dispersion laws to arrive at the proper filter cutoff frequency and resonance. Enter them. Notice the asterisk "*" that appears after the name. This is to tell you that the program has been changed and that you will lose the changes if you don't do a save.

→ See ***Saving a Program*** on page 129.

To avoid going through the entire arduous math the *next* time you want to mimic the frequency response of your neighbor's television, you should save your tweaks as a new program. Press the PROGRAM key to enter the program area.

Press the PROGRAM key a second time and then press the **Save** SOFT KEY. Check that there is enough **Space** and then place the cursor over the **rename** field and press SELECT.

Use the fancy typewriter to give your tweak an endearing name. Then place the cursor over **Enter** and press SELECT to return to the **Save** menu page.

→ To learn how to enter text, see ***Entering or Changing Text*** on page 20.

Turn the KNOB on the top line to select an unoccupied program slot. Then place the cursor over **save** and press SELECT!

After selecting **save**, you can verify that your program is now listed under the **list** menu page in the PROGRAM area. Note that there is a U to the left of the I/O Identifiers - this shows that this was saved as a User Program. A C would indicate that the program was saved on a Memory Card.

Now, you can load your tweak and feel edgy and irritated even when the neighbors are on vacation!

→To read about using Memory Cards, see ***Memory Cards*** on page 49.

Using User Groups to Organize Useful Programs

The H8000FW contains an easy to use facility for organizing programs that you find useful. You may want to keep a "collection" of your favorite programs. You may want to keep a "collection" of effects that were used on a particular project. You may want to keep a "collection" of programs for use during a show.

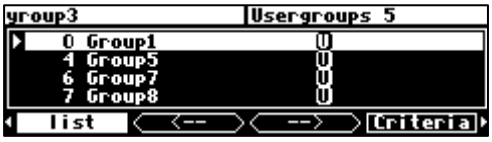
→See ***Categorized by You (User Groups)*** on page 120 for more info.

Go to the **usergrp** menu page in the PROGRAM area. There are twenty groups in which we can collect programs, ten stored internally U and ten on a Memory Card C. Let's say we want to collect the currently loaded program, **Seethy Two Reverb**, in **Group3**. Simply move the cursor to "Loaded Program" and hit SELECT. This will put the name in the top row (or, you could use the knob or keypad to find it, but this is easier). Then move to the second row and turn the KNOB until **Group3** appears and press SELECT! This will change **out** to **in** and vice-versa. The Usergroup will be saved automatically every time a change is made.

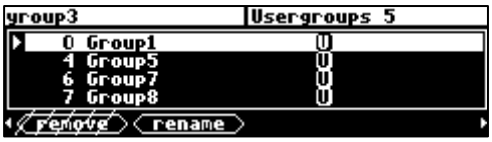
Now for quick access to your collections, set **Search By** to **User Grp** on the **Criteria** menu page in the PROGRAM area.

Go to the **list** menu page and use the **‹ - -** and **- - ›** SOFT KEYS to find **Group3**. There's the **Seethy Two Reverb**!

You can also change the names of the groups to something more useful than "group." Press and hold the PROGRAM key until you see the Routing Storage area. Do it again until you see the Setup Storage area. Do it *again*! Now you'll see all the Usergroups!



To rename a group, highlight it with the KNOB. Then tap the PROGRAM key so you can see the **‹rename›** SOFT KEY. Press the **‹rename›** key and use the typewriter to enter a better name. When you're finished, use the **Enter** key to save your chosen name!



→See *Entering or Changing Text* on page 20

Wrap Up

So, there you have it. The procedure we followed in this ***Quickstart*** section is more or less the procedure you will follow whenever you use the H8000FW. First, you will determine an appropriate routing configuration for the task at hand and either load it from the Routing area or make it from scratch (you'll learn how in the ***Operation*** guide). Then, you'll load appropriate programs into DSP A and DSP B being mindful of the "I/O Identifiers" and their bearing on the routing configuration or you'll load a monolithic program. *This may be an over-simplification! You may very well select appropriate programs for the task at hand and* then *determine an appropriate routing configuration for those programs!* Once the routing configuration is set and the programs are loaded, you'll probably "tweak" the parameters on those programs to fit the situation. When you're done using a program, you'll probably save your "tweak" for future use.

Doing this much will give you an appreciation of the horsepower under the hood of the H8000FW. But *only* doing this much *won't* give you an appreciation of the amazing versatility of the H8000FW. In addition to simply loading routing configurations, you can manually configure things any way you like.

→ See ***The Comprehensive Input / Output Scheme on page 51***.

In addition to altering levels at the inputs, you can alter and monitor levels at any point in the signal path.

→ See ***Controlling Levels*** on page 74.

Programs and routing configurations can be saved to and loaded from removable Memory Cards, as well as internal memory.

→ See ***Memory Cards*** on page 49.

In addition to using system bypass, DSP A and DSP B can be muted or bypassed independently of each other.

→See ***Bypassing and Muting*** on page 92.

In addition to loading programs from the front panel, programs can be loaded remotely via MIDI program change messages or external "triggers."

→ See Loading a Program Remotely on page 125.

The digital inputs and outputs have comprehensive sample rate and word length parameters to complement any digital installation.

→ See Digital Setup on page 80.

Any parameter anywhere in the H8000FW can be "remote controlled" via MIDI or the rear panel foot pedal jacks 1 and 2.

→ See Setting Up the External Controllers on page 94, External Modulation and Trigger Menu Pages on page 98, and Remote Controlling Parameters on page 113.

Existing programs can be altered or entirely new programs can be created in the Patch Editor.

→ See the separate ***Programmer's Manual***.

Mounting and Handling

Normally, the H8000FW will be rack mounted in a standard 19 inch rack. If the rack will be taken on the road, the H8000FW should be supported at the rear. It is advisable to keep the rack well ventilated and in a dry, dust-free environment, so that heat and moisture won't cause degradation of performance. Contrary to some reports, we have found that soda/beer splashed liberally about the front panel does *not* enhance the reliability of the H8000FW. Since the H8000FW has few internal connectors, it should hold up well under "road conditions."

Memory Cards

All functions that work on internal user memory also work on Memory Cards. The H8000FW supports three types of Memory Card:

1) PCMCIA type 1 ATA.

2) PCMCIA type 1 static RAM up to 4,194,304 bytes (4 megabytes).

3) Compact Flash (using a suitable adaptor).

The H8000FW does not support PCMCIA "Linear Flash," "SmartMedia™," "XM™" or other cards not listed above.

Of the above, the most easily obtainable (and cheapest) is the Compact Flash card, which is used extensively in digital cameras. These can also be read by PCs (and some Macs) with the use of a low cost USB adaptor. This allows saved programs to be backed up or organized on the computer.

A PCMCIA *static RAM* Memory Card will not maintain memory if the battery dies or if the battery is removed. To change the battery without losing information, change it while it's plugged into a powered-up H8000FW. A conservative estimate puts the lifetime of a battery at a year. . . Like gambling on the stock market, bet only what you can afford to lose. . . Some static RAM cards use a rechargeable battery - these must be left in the card slot of a powered-up H8000FW every now and then in order to maintain their charge.

Insert a Memory Card by pushing it into its slot until it "locks" into place. The Memory Card Release will "lengthen," and with a PCMCIA SRAM card the display will briefly read

Checking "Memory Card". . or **Checking "GTR Library". .** or (generally) **Checking "whatever-the-name-of-this-card-is". .**

Remove a Memory Card by pressing the Memory Card Release - but don't remove a Memory Card when the BUSY LED is lit! A program that was loaded from a Memory Card continues to run even if the Memory Card is subsequently removed. The Memory Card only needs to be in place during PROGRAM and Routing Storage area functions such as loading, **Save**, **update**, **remove**, etc. *The BUSY LED is used to indicate that a Memory Card is being written to. However, if there is no Memory Card in place, the BUSY LED indicates data at the MIDI In port or the serial port. You may want to use this latter feature during a session that requires periodic use of a Memory Card. Simply insert the Memory Card when you need to load something from it or save something to it. Remove it when you are done loading or saving, and the BUSY LED will be available for "data indication."*

When a Memory Card is inserted, the H8000FW may report that the card is not formatted and offer to format it. If the Memory Card has already been formatted and the format question is presented, then there is a problem. Try removing and re-inserting the card. Try blowing on the business end of the card like an old Atari 2600 game (no spittle!). Formatting will erase all programs and banks on the card!

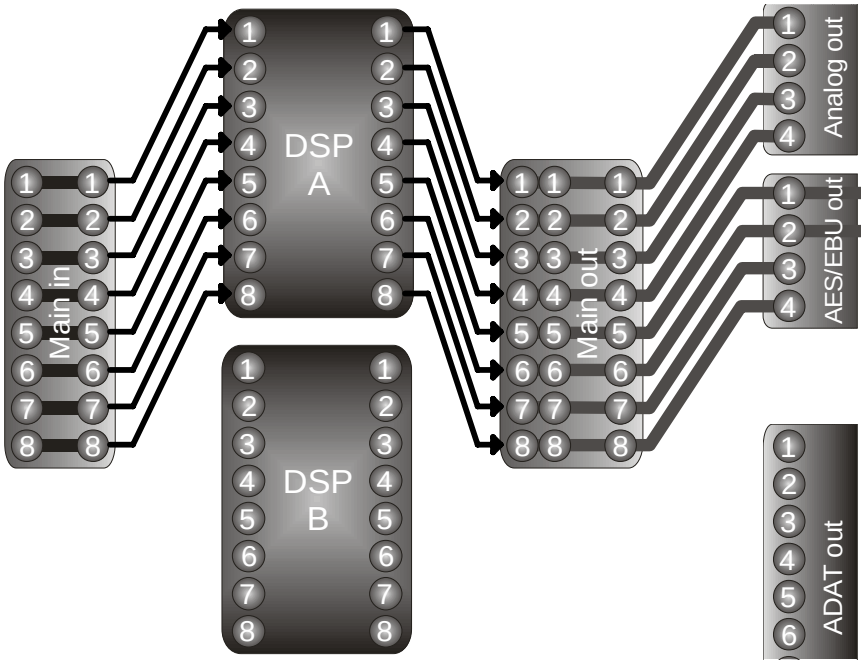
→ To manually format a Memory Card, see ***Fixing PCMCIA SRAM Memory Card Problems*** on page 150.

Note: Like fine china, Memory Cards are fragile:

- Treat them with respect.
- Don't lie to them.
- Don't store them on your dashboard or in your toaster.
- Avoid shocking them with static electricity (or any kind of electricity for that matter).

→ For information about Memory Card problems and how to fix them, see ***Fixing PCMCIA SRAM Memory Card Problems*** on page 150.

The Comprehensive Input / Output Scheme



All right, the word "comprehensive" has been used a bit much in this manual so far, but it's appropriate! The various inputs, outputs, and DSPs can be connected in just about any way you can think of!

The Eventide H8000FW series can have a large number of inputs and outputs, allowing a huge range of connection possibilities. The illustrations shown in this section are derived from the Routing utility, which runs on ar PC running Windows 95 or above and may be downloaded from the Eventide Web Site www.eventide.com

The core of the H8000FW consists of two separate effects processors or machines, shown above as ***DSP A*** and ***DSP B***. Each of these has eight inputs and eight outputs. Also shown are two "terminal blocks", ***MAIN Inputs*** (shown above as **Main in**) and ***MAIN Outputs*** (shown above as **Main out**), which are used to connect to them from the outside world. Each block shown above has inputs on its left side and outputs on its right.

The ***MAIN Inputs*** block is where all the external analog and digital inputs are connected.

⇒ *See* ***Configuring the Main Inputs***

Each ***DSP*** may be fed from any output from either ***DSP*** or from the ***MAIN Inputs*** block. In the interest of avoiding annoying feedback, you will not normally connect a ***DSP***'s input to one of its own outputs, but if you really want to, you can …

⇒ *See* ***Configuring the DSP input sources***

The ***MAIN Outputs*** block may be fed from any of the outputs of either ***DSP*** or from the ***MAIN Inputs*** block. Each channel has two inputs - signals connected to then will be added together (mixed). Be aware that if two peak level signals are added in this way, it can overload the outputs.

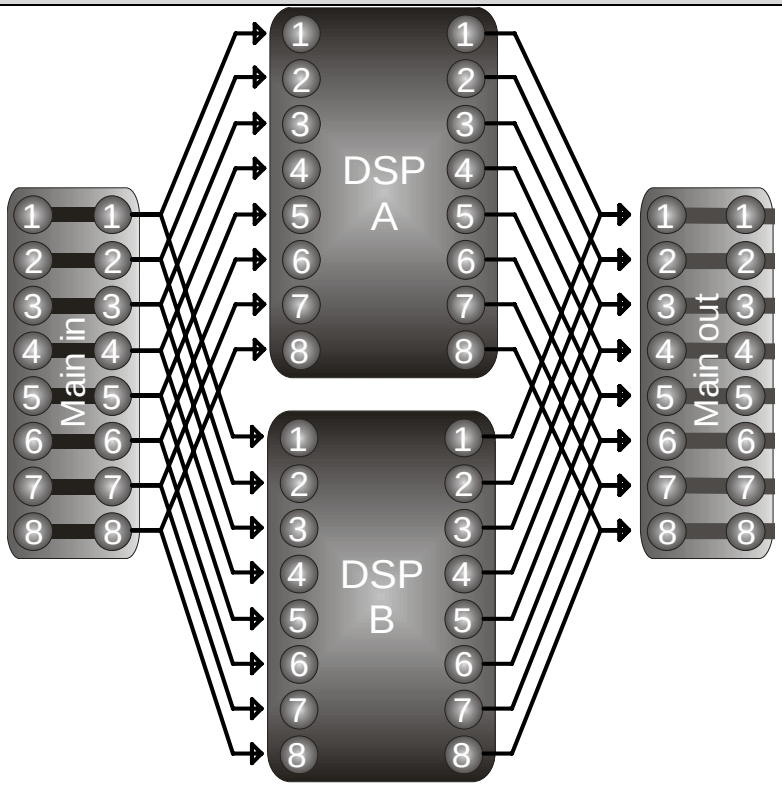
⇒ *See* ***Configuring the MAIN Outputs***

The first four channels of ***MAIN Outputs*** feeds four analog outputs, as shown. Similarly, the second four channels feed four AES/EBU outputs. The ***MAIN Outputs*** block may also feed other outputs, to be discussed later.

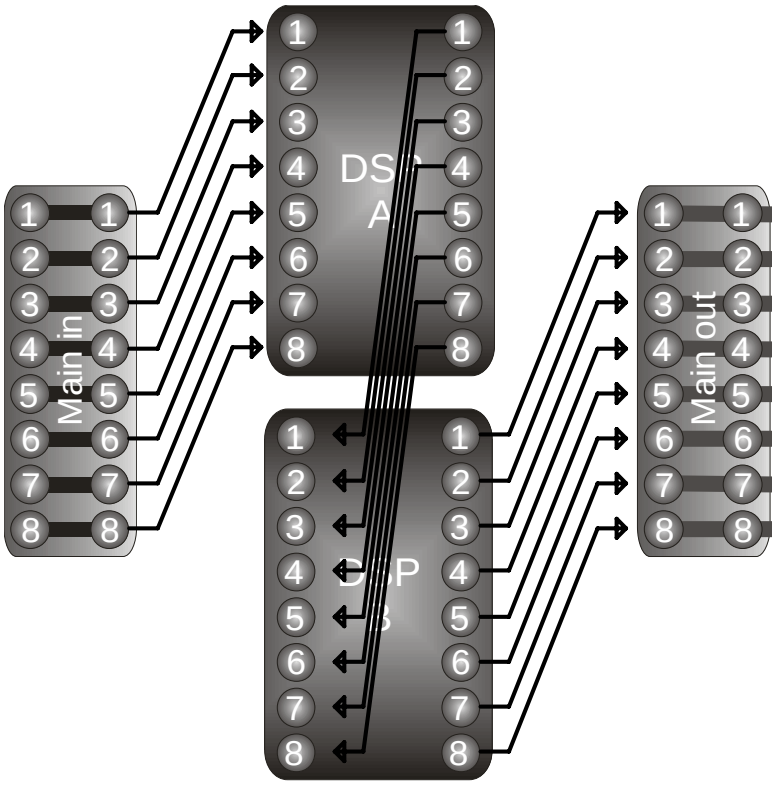
⇒ *See* ***Connecting to the H8000FW's outputs***

The example above shows ***DSP A*** being fed from the ***MAIN Inputs*** block, and its outputs feeding ***MAIN Outputs***. ***DSP B*** is shown as not used.

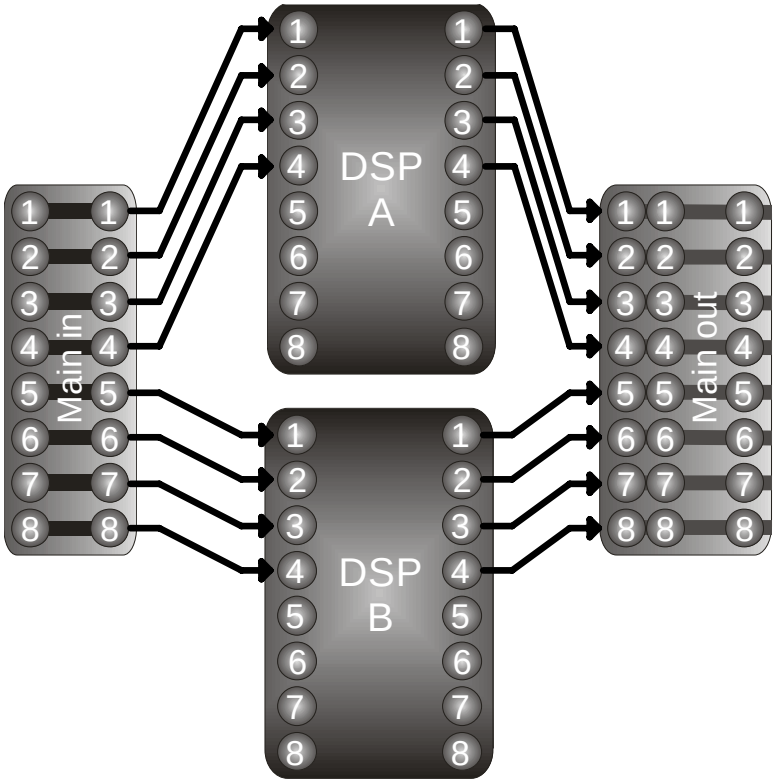
This example shows ***DSP A*** and ***DSP B*** running in parallel, both being fed from ***Main in*** and their outputs being mixed at ***Main out***.



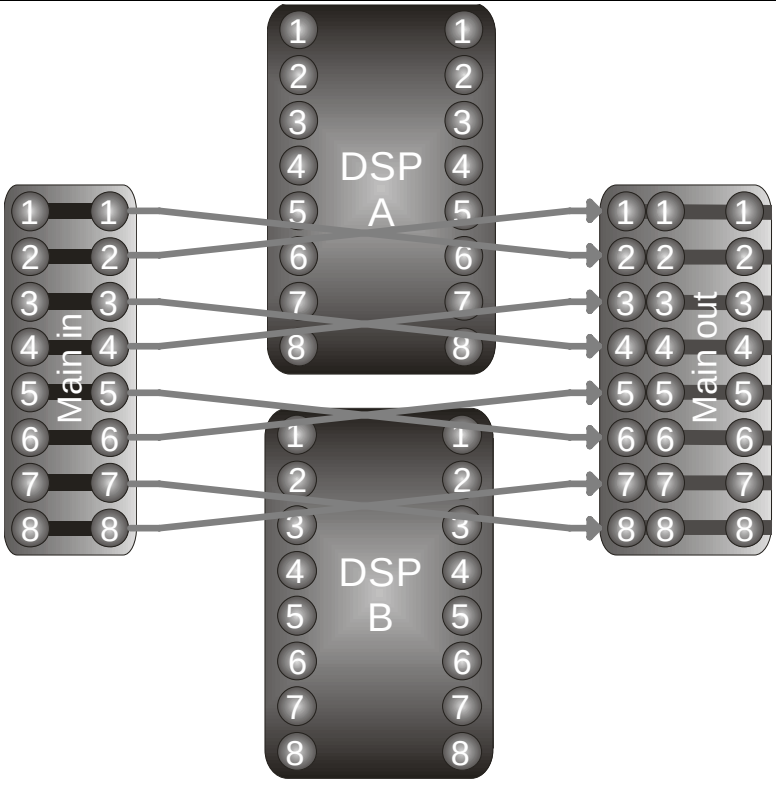
This example shows ***DSP A*** and ***DSP B*** running in series with ***Main in*** feeding ***DSP A*** which feeds ***DSP B***, whose outputs feed ***Main out***.



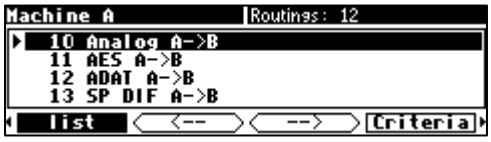
This example shows ***DSP A*** and ***DSP B*** as two separate four channel units, with ***DSP A*** using the first four channels and ***DSP B*** using the second four.



This example shows ***DSP A*** and ***DSP B*** entirely bypassed, with ***Main in*** feeding ***Main out***, with alternate channels exchanged.



Routing Configuration



Because of the large numbers of routing options and possible configurations, routings are most usefully loaded as presets, which can be accessed by pressing and holding the PROGRAM key. In those cases where the factory-supplied routings are not sufficient, time may be saved by picking the nearest one and making such modifications as are required. The result can then be saved under a new name. For completeness, a description of each routing option follows.

All the individual routing pages are accessed from the main SETUP page.

Connecting real world inputs to the H8000FW

Different versions of the H8000FW support a wide range of possible inputs, as described in the chart below. Be aware that, as described above, when using either effects unit (DSP), the external inputs must be connected to the ***MAIN Inputs*** block. This limits the number of channels that can feed the effects units to eight, the number of inputs to the ***MAIN Inputs*** block. In many cases, external inputs may be connected to external outputs without this limitation, as described later.

	Analog	***AES/EBU***	***ADAT***	***FireWire***
H8000	2 channels	8 channels	8 channels	
H8000A	4 channels	4 channels	8 channels	
H8000FW	4 channels	12 channels	8 channels	16 channels

CONFIGURING THE MAIN INPUTS

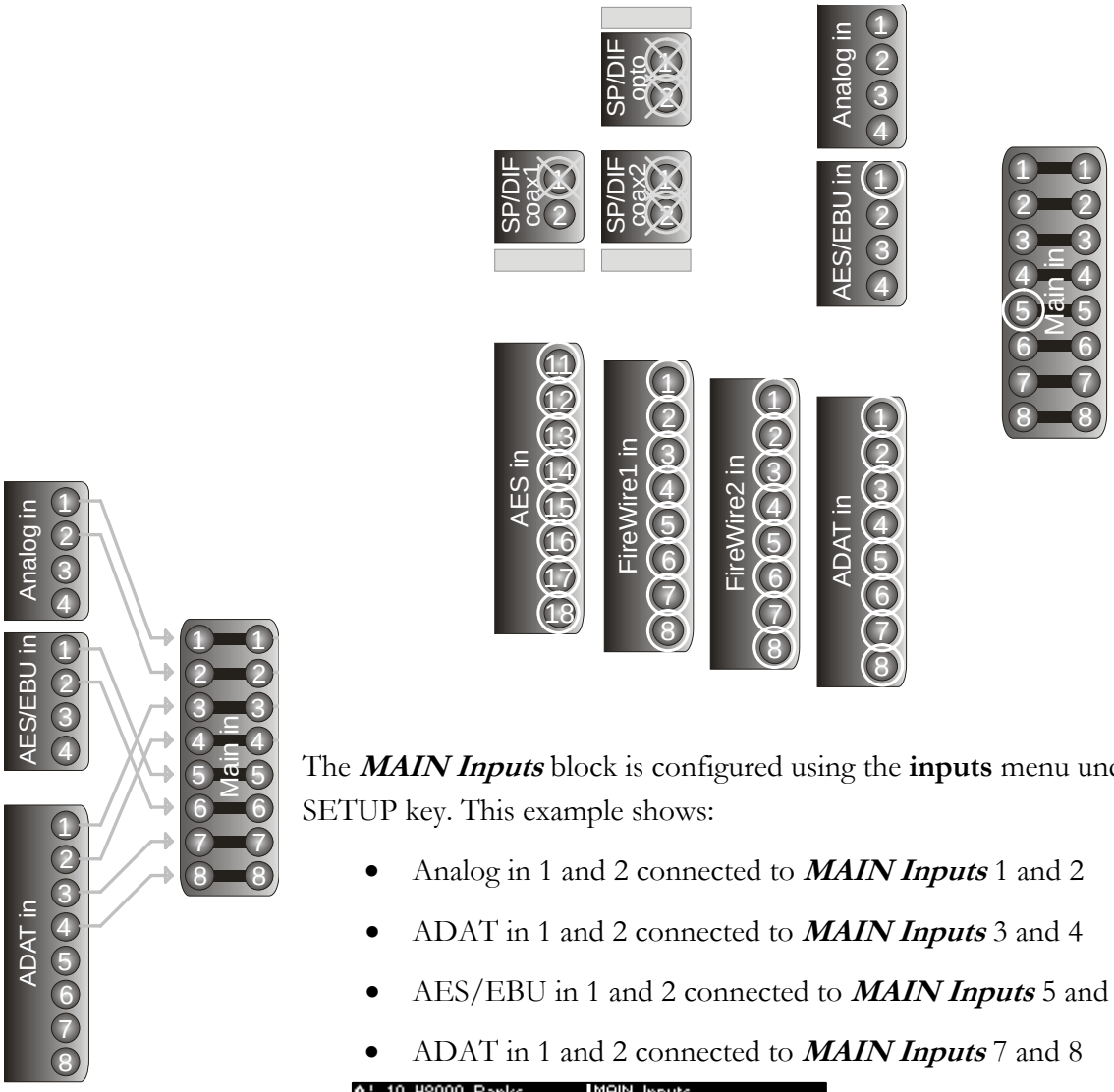
The MAIN Inputs block is used as a binding post to select the inputs that are to be fed to DSP A or DSP B. Each unit in the H8000FW series has a number of default inputs, which only connect to the corresponding input of the MAIN Inputs block as shown below:

The other inputs may be connected to any channel of the MAIN Inputs block.

⇒ *See Further input options to select SPDIF 1&2 or Analog 1&2 on the H8000.*

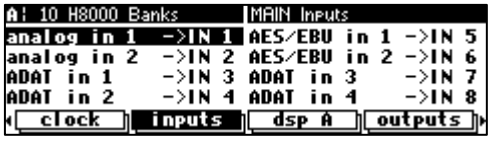
N Inputs channel	*H8000 input*	*H8000A input*	*H8000FW input*
1	AES/EBU 1 / SPDIF 1	Analog 1	Analog 1
2	AES/EBU 2 / SPDIF 2	Analog 2	Analog 2
3	AES/EBU 3	Analog 3	Analog 3
4	AES/EBU 4	Analog 4	Analog 4
5	AES/EBU 5	AES/EBU 1 / SPDIF 1	AES/EBU 1 / SPDIF 1
6	AES/EBU 6	AES/EBU 2 / SPDIF 2	AES/EBU 2 / SPDIF 2
7	AES/EBU 7 / Analog 1	AES/EBU 3	AES/EBU 3
8	AES/EBU 8 / Analog 2	AES/EBU 4	AES/EBU 4

Thus, using the H8000FW as an example, the fifth channel of ***MAIN Inputs*** (shown to the right of the inputs) may be connected to the first channel of ***AES/EBU in*** (the corresponding default input), or any channel of ***AES in***, ***FireWire1 in*** or ***FireWire2 in*** or ***ADAT in***.



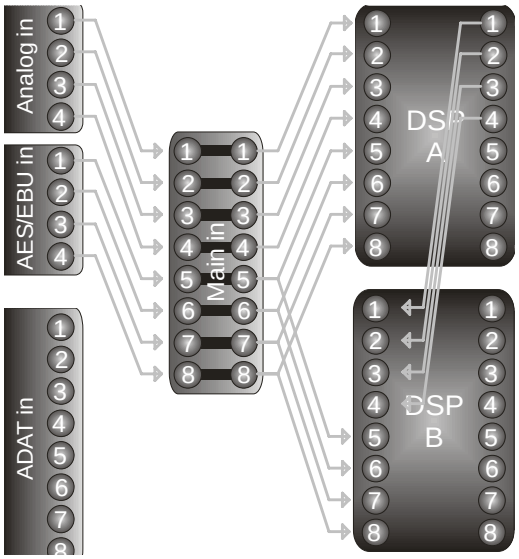
The ***MAIN Inputs*** block is configured using the **inputs** menu under the SETUP key. This example shows:

- Analog in 1 and 2 connected to ***MAIN Inputs*** 1 and 2
- ADAT in 1 and 2 connected to ***MAIN Inputs*** 3 and 4
- AES/EBU in 1 and 2 connected to ***MAIN Inputs*** 5 and 6
- ADAT in 1 and 2 connected to ***MAIN Inputs*** 7 and 8



CONFIGURING THE DSP INPUT SOURCES

Any DSP input may be fed from any of the ***MAIN Inputs*** block outputs, or from any output of either DSP. Note that the ***MAIN Inputs*** block's channel names change to show what is connected to it – in the example below it is connected to Analog in 1-4 and AES/EBU in 1-4.



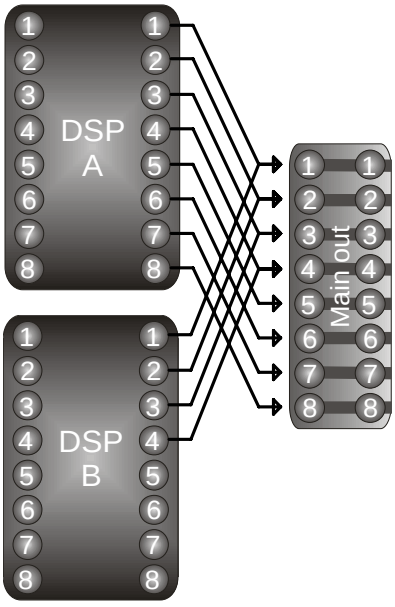
A! 10 H8000 Banks	Dsp A i/p routing
analog in 1 -> IN1	AES/EBU in 1 -> IN5
analog in 2 -> IN2	AES/EBU in 2 -> IN6
analog in 3 -> IN3	AES/EBU in 3 -> IN7
analog in 4 -> IN4	AES/EBU in 4 -> IN8
clock / inputs / dsp A / outputs	

A! 10 H8000 Banks	Dsp B i/p routing
dsp A out 1 -> IN1	AES/EBU in 1 -> IN5
dsp A out 2 -> IN2	AES/EBU in 2 -> IN6
dsp A out 3 -> IN3	AES/EBU in 3 -> IN7
dsp A out 4 -> IN4	AES/EBU in 4 -> IN8
clock / inputs / dsp B / outputs	

CONFIGURING THE MAIN OUTPUTS

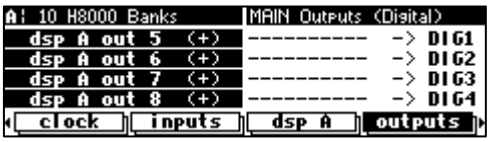
The main outputs may be fed from any DSP output or from any of the ***MAIN Inputs***. Up to two signals may be connected to each output. There are two pages - one for channels 1-4, feeding the main Analog outputs as shown above, and another for channels 5-8, feeding the main AES/EBU outputs.

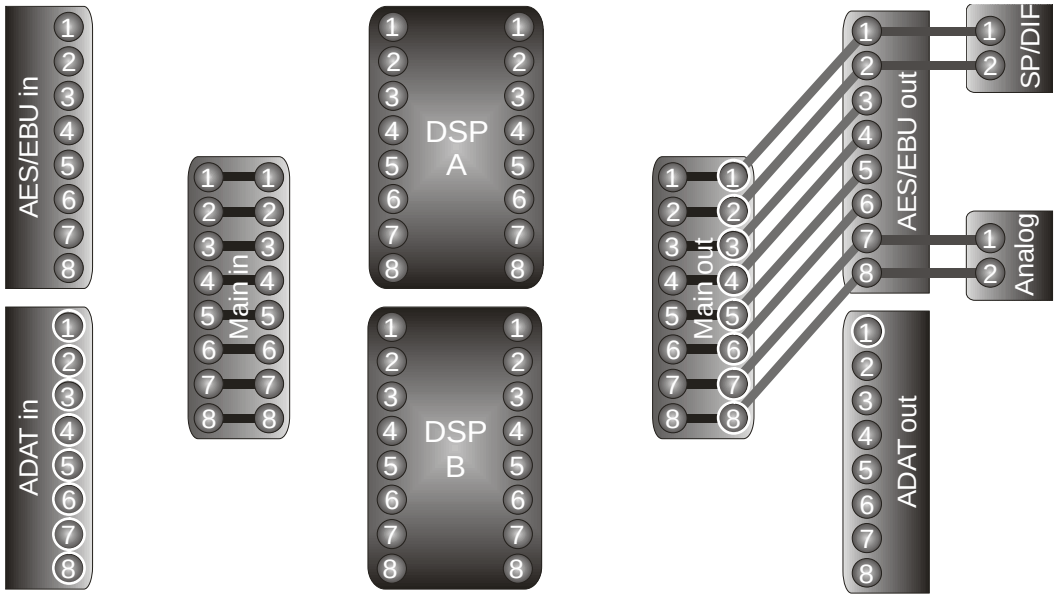
Here we have DSP A 1-4 and DSP B 1-4 feeding Main output channels 1-4 (Analog). This means that, for example **DSP A out 1** and **DSP B out 1** are mixed together to feed **Main out 1**.



A! 10 H8000 Banks	MAIN Outputs (Analog)
dsp A out 1 (+)	dsp B out 1 -> ANA1
dsp A out 2 (+)	dsp B out 2 -> ANA2
dsp A out 3 (+)	dsp B out 3 -> ANA3
dsp A out 4 (+)	dsp B out 4 -> ANA4
clock / inputs / dsp A / outputs	

Here we have DSP A 5-8 feeding ***MAIN Output*** channels 5-8 (Digital)





Connecting to the H8000FW's outputs

Different versions of the H8000FW support a wide range of possible outputs, as described in the chart below. Be aware that, as described above, the external outputs must be fed from the ***MAIN Outputs*** block.

The available outputs are:

	Analog	***AES/EBU***	***ADAT***	***FireWire***
H8000	2 channels	8 channels	8 channels	
H8000A	4 channels	4 channels	8 channels	
H8000FW	4 channels	12 channels	8 channels	16 channels

CONFIGURING THE OUTPUTS

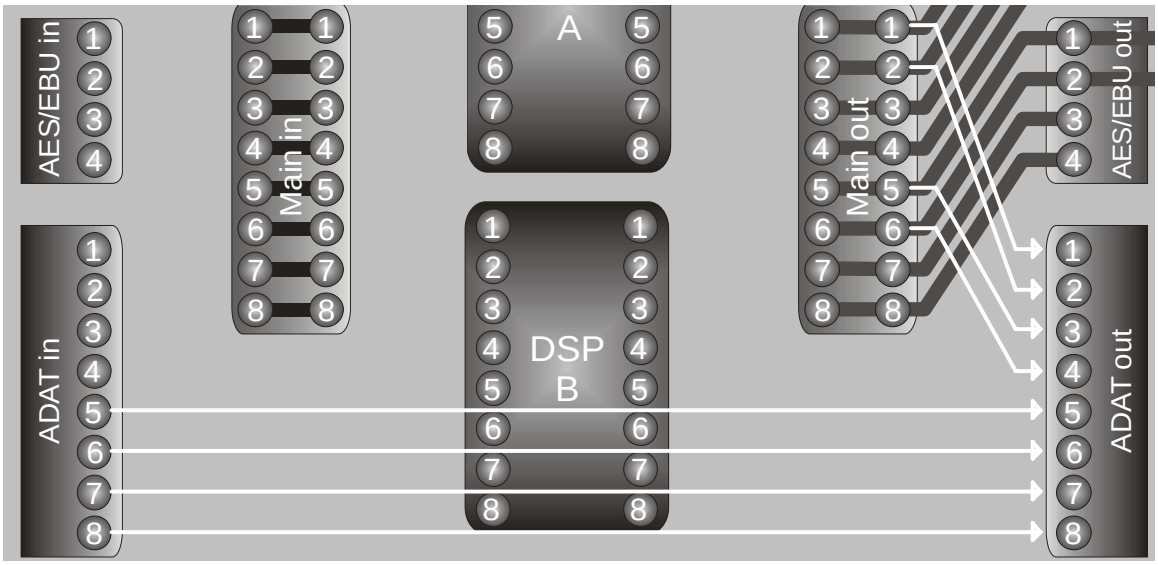
The ***MAIN Outputs*** block is used as a "binding post" to select the outputs that are to be fed from DSP A or DSP B. Each unit in the H8000FW series has a number of *default* outputs, which are always connected to the corresponding output of the ***MAIN Outputs*** block as shown below:

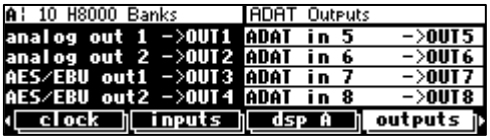
MAIN Outputs channel	***H8000 output***	***H8000A output***	***H8000FW output***
1	AES/EBU 1 and SPDIF 1	Analog 1	Analog 1
2	AES/EBU 2 and SPDIF 2	Analog 2	Analog 2
3	AES/EBU 3	Analog 3	Analog 3
4	AES/EBU 4	Analog 4	Analog 4
5	AES/EBU 5	AES/EBU 1 and SPDIF 1	AES/EBU 1 and SPDIF 1
6	AES/EBU 6	AES/EBU 2 and SPDIF 2	AES/EBU 2 and SPDIF 2
7	AES/EBU 7 and Analog 1	AES/EBU 3	AES/EBU 3
8	AES/EBU 8 and Analog 2	AES/EBU 4	AES/EBU 4

The remaining (non-default) outputs may be connected to any of the MAIN Outputs channels, or to any of the non-default external inputs, with the exception that FireWire outputs may not be directly connected to FireWire inputs. The H8000FW example below shows that ADAT out 1 may be connected to any MAIN Outputs channel, or any ***ADAT in*** channel. The permanently connected default outputs are also shown.

The outputs are configured using the **outputs** menu under the SETUP key. There is one page for each output block, including the ***MAIN Outputs*** described earlier.

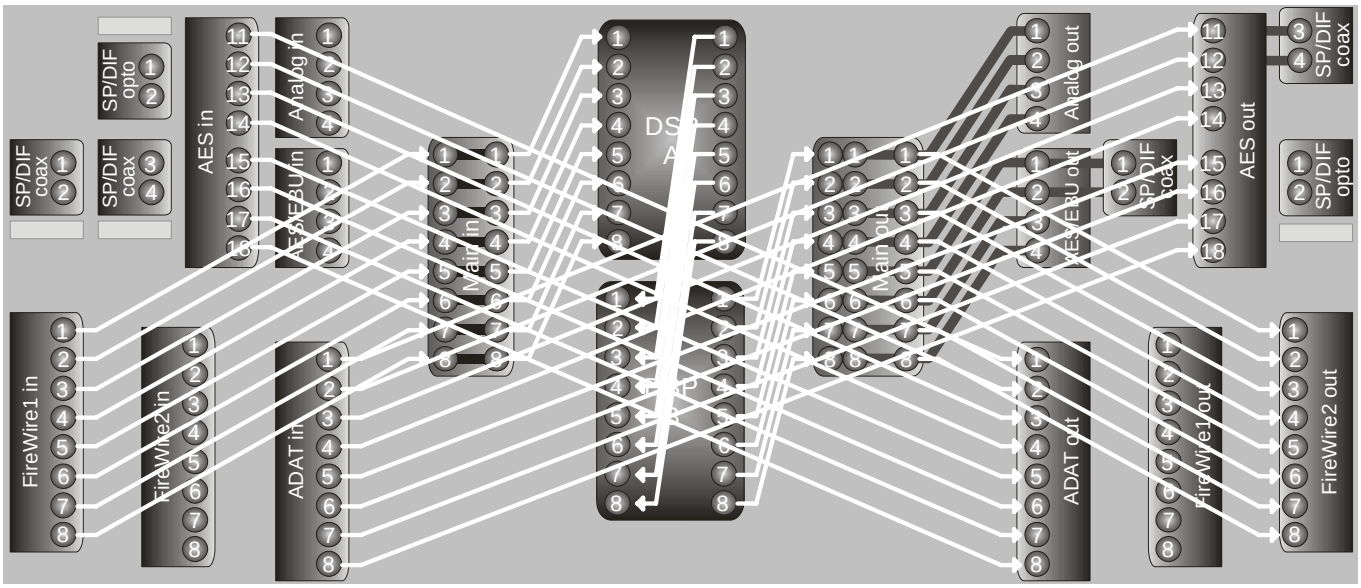
Here is an example of a mixture of signals feeding the ADAT outputs. The other blocks are shown below as unconnected in the interest of clarity.





Note that on software V4.6 and earlier, the Main out block signals are named according to the corresponding *default* output.

Here is a complete example using the H8000FW.



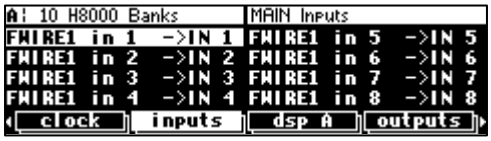
- ***FireWire1 in*** feeds the ***MAIN Inputs***, which connect to ***DSP A***.
- ***DSP A*** feeds ***DSP B*** which feeds the ***MAIN Outputs***.
- ***The MAIN Outputs*** are connected to ***FireWire2 out***.

Thus we have 8 input channels on ***FireWire1*** which go through the 2 effects blocks one after the other and are sent back up ***FireWire2***. The ***MAIN Outputs*** signals also feed the default outputs ***Analog out*** and ***AES/EBU out*** in the normal way.

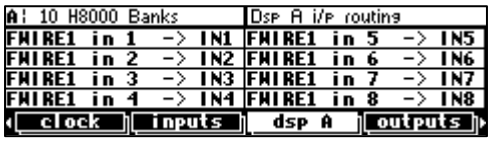
In addition, ***AES11-18*** in are connected to ***ADAT out***, and ***ADAT in*** is connected to ***AES11-18 out***, both without any effects processing.

The drawing above has a lot going on and may be a little hard to read, so it might be more helpful to look at the routing screens that produce it.

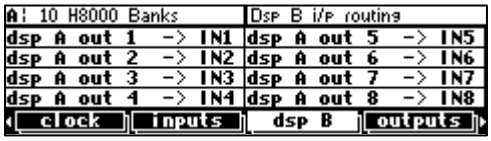
Here we can see that FireWire1 channels 1 to 8 are connected to ***MAIN Inputs***

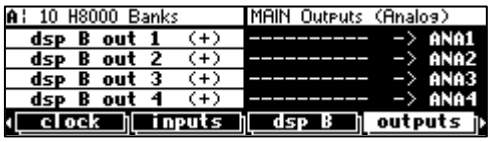


DSP A gets its inputs from ***MAIN Inputs***, with the signals renamed to show what is connected to ***MAIN Inputs***, i.e. FireWire 1 to 8.

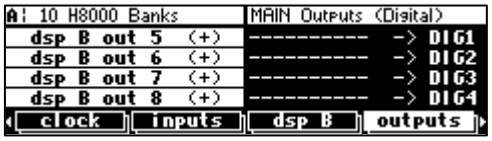


DSP B gets its inputs from the outputs of ***DSP A***.

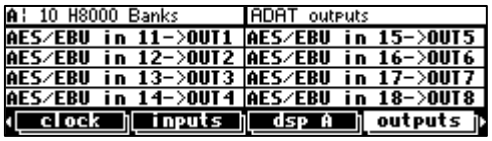




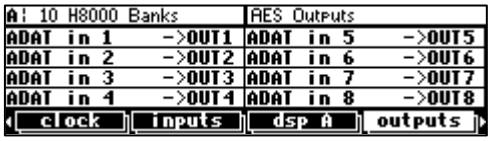
The first four channels of ***MAIN outputs*** (those connected to the default Analog outputs) get their signals from ***DSP B*** channels 1 to 4.



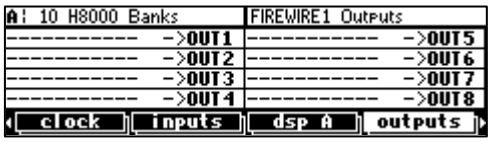
The second four channels of Main out (those connected to the default Digital outputs) get their signals from DSP B channels 5 to 8.



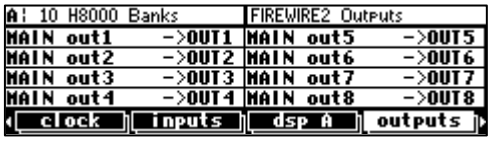
The ADAT outputs are directly connected to AES inputs 11 to 18.



AES outputs 11 to 17 are fed from the ADAT inputs.



FireWire1 outputs are not connected.

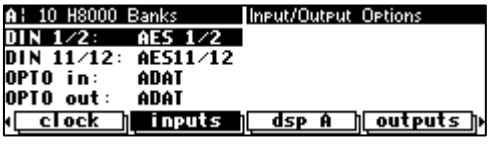


FireWire2 outputs are fed from ***Main out***.

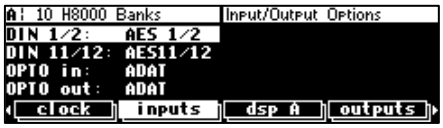
Further Input and Output options

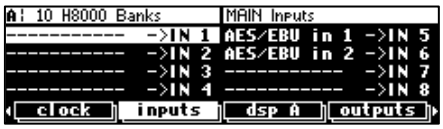
There are a number of alternative inputs and outputs, which may take the place of the normal ones. For example, all members of the H8000 family have an S/P DIF input on an RCA connector that may be used in place of AES/EBU 1&2. These options may be controlled from the ***Input/Output Options*** page under **inputs** on the SETUP menu. Just hit the **inputs** soft key until you get there.

The screen below is for the H8000FW but a similar page appears on all members of the family.

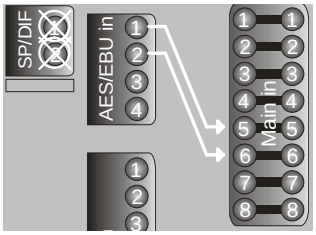


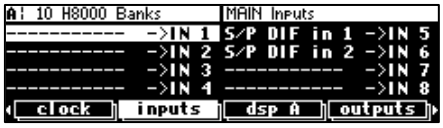
DIN 1/2 Allows the Selection of Either AES/EBU or S/P DIF for the First Digital Input Pair.



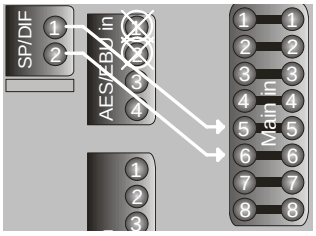


When set to AES/EBU the first 2 default digital inputs are AES/EBU and the S/P DIF inputs are not used.

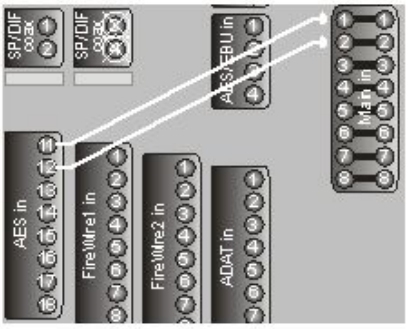


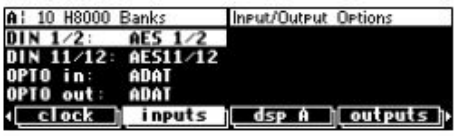


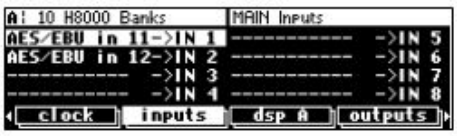
When set to S/P DIF the first 2 default digital inputs are S/P DIF 1/2 and the first AES/EBU XLR connector is not used.



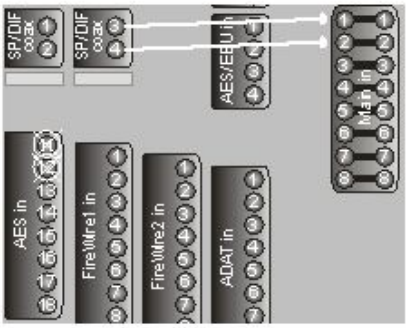
DIN 11/12 Allows the Choice of Either AES/EBU or S/P DIF for AES11/12.

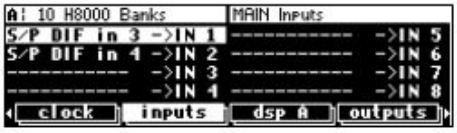






AES11/12 is active and the second set of S/P DIF signals (S/P DIF 3/4), are not available.





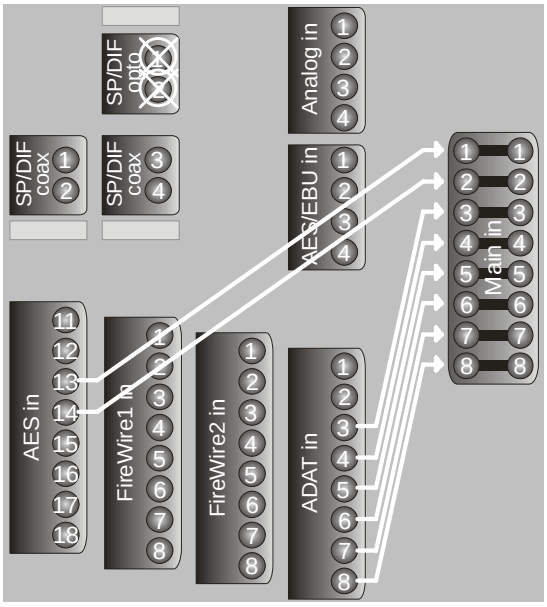
The second set of S/P DIF signals (S/P DIF 3/4) are used in place of AES11/12, which is thus not available.

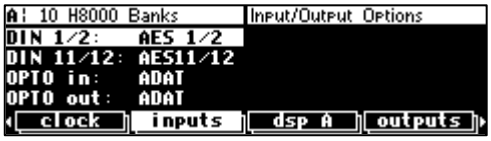
OPTO in – controls the function of the optical input connector (H8000FW only)

The optical input connector on the rear panel is normally used for ADAT. It may alternatively be used to send an optical S/P DIF input, called OPTO 1/2 in place of one pair of AES11-18.

Doing this will disable both the ADAT input block (since there is nowhere to plug the ADAT cable) and the AES signals for the chosen pair (since it is being used for OPTO 1/2).

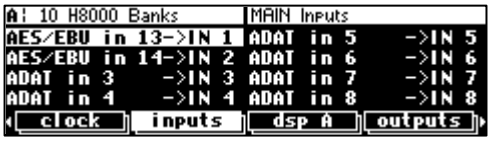
Note also that this control supersedes the **DIN 11/12** control, so that if OPTO in is set to AES 11/12, **DIN 11/12** has no function and will be disabled. This is because if AES11/12 is being used for OPTO, it cannot be used for either AES or S/P DIF.

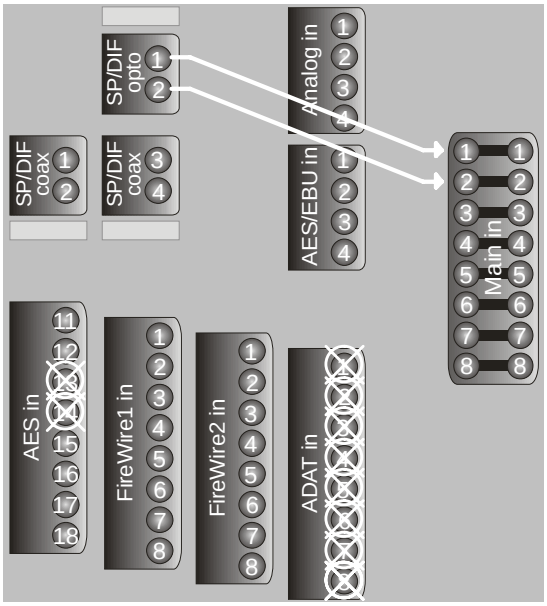


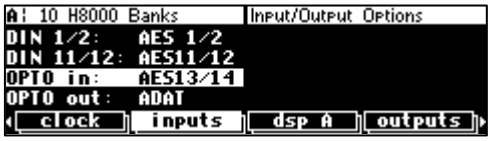


When **OPTO in** is set to **ADAT**, the optical input connector is used for ADAT input, and AES inputs 11-18 are available.

OPTO 1/2 are, of course, not available.

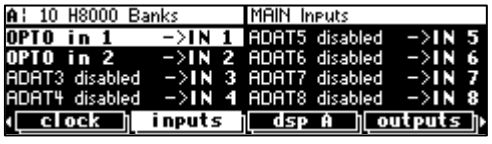






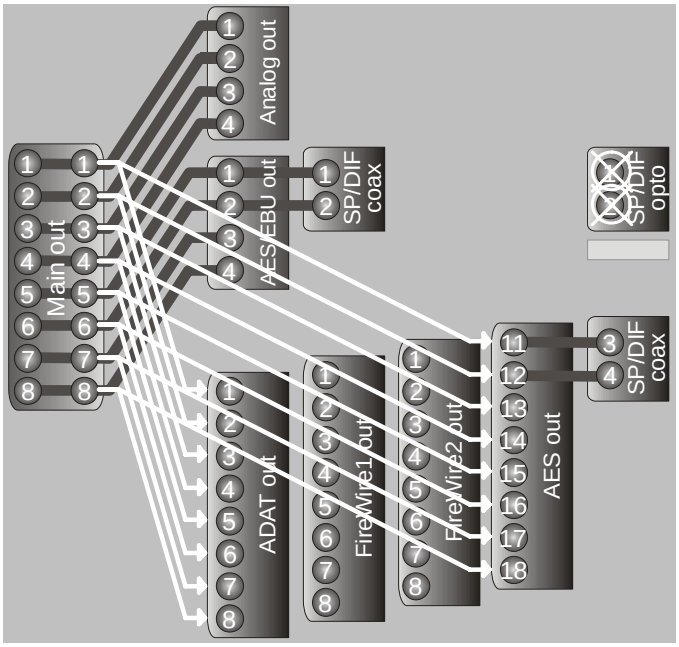
When **OPTO in** is not set to **ADAT**, the optical input connector is used for OPTO 1/2 (optical S/P DIF) input, and the selected AES inputs are replaced by it and thus not available.

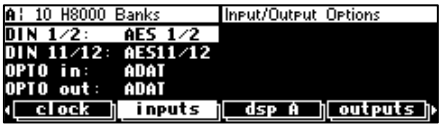
All ADAT inputs are, of course, disabled.



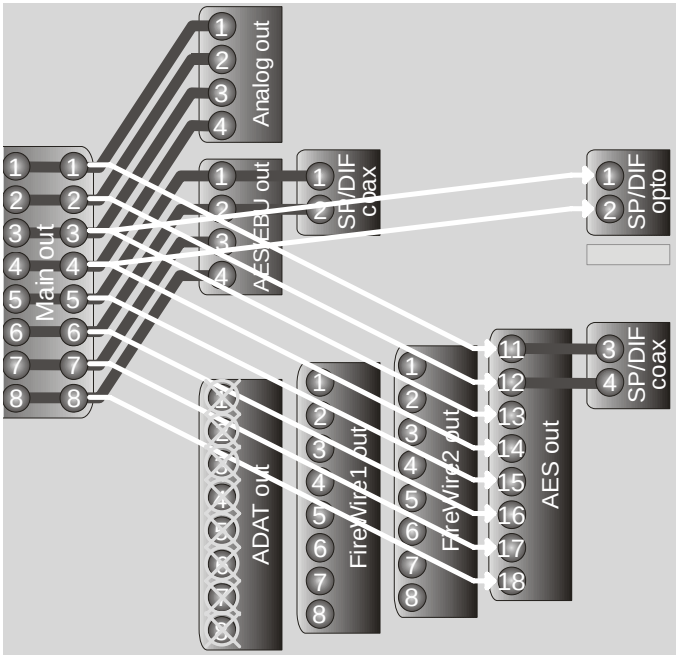
OPTO out – allows use of optical output connector for optical S/P DIF (H8000FW only)

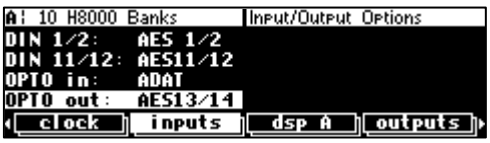
The optical output connector is normally used for ADAT. It may optionally be used to supply one pair of AES 11-18 as an optical S/P DIF output. In this case all the ADAT outputs are unavailable (ADAT connector unavailable). The selected AES output pair is still available.





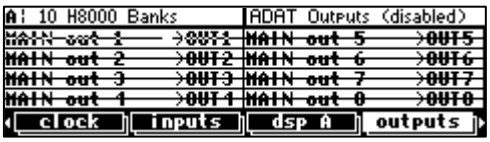
OPTO out is set to ADAT, so optical S/P DIF out cannot be used.





OPTO out is set to AES13/14, so it is driven in parallel with AES13/14.

ADAT out cannot be used.



Signal Flow Example

Now that you're familiar with the actual menu pages employed in signal routing, let's run through a realistic, but fairly involved signal routing. Four main steps are required for routing any configuration:

- Select "sources" for the ***Main in*** "input block" at SETUP / **inputs**.
- Select "sources" for DSP A's inputs at SETUP / **dsp A**.
- Select "sources" for DSP B's inputs at SETUP / **dsp B**.
- Select "sources" for the ***Main out*** "output block" at SETUP / **outputs**. (Recall that the analog and AES/EBU outputs are always fed from here.)

Optionally:

- Select "sources" for the ADAT outputs at SETUP / **outputs** (third menu page).

For the H8000FW:

- Select "sources" for AES11/18 outputs at SETUP / **outputs** (fourth menu page).
- Select "sources" for FIREWIRE1 outputs at SETUP / **outputs** (fifth menu page).
- Select "sources" for FIREWIRE2 outputs at SETUP / **outputs** (sixth menu page).

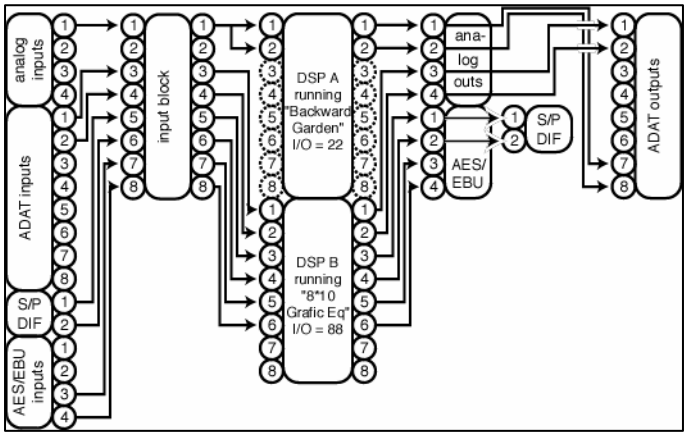
Once the routing is configured, you can, at your discretion, change *levels* at:

- The analog inputs. Use LEVELS / **inputs**
- Use the "bottom" menu page for pre-A/D adjustments.
- Use the "top" menu page for post A/D adjustments *(note – using the pre-A/D control will give a better signal)*.
- The digital inputs. Use LEVELS / **inputs**.
- The inputs to DSP A. Use LEVELS / **dsp A**.
- The inputs to DSP B. Use LEVELS / **dsp B**.
- The outputs of DSP A. Use LEVELS / **dsp A**.
- The outputs of DSP B. Use LEVELS / **dsp B**.

- The analog outputs. Use LEVELS / **output**.
- The digital outputs. Use LEVELS / **output**.

You can also alter the "Wet/Dry" ratio inside each DSP at LEVELS / **dsp A** or LEVELS / **dsp B**.

→ These levels parameters are discussed at length in *Controlling Levels* on page 74.



Now, let's assume we've loaded a multichannel effect on DSP B, such as **8*10 Grafic Eq**. This program effectively places a 10-band equalizer between each of its inputs and outputs. It behaves like eight independent equalizers. Let's say you want to use these equalizers on a pair of ADAT inputs, a pair of S/P DIF inputs, and a pair of AES/EBU inputs. Further, assume you've loaded **Backward Garden** on DSP A and you want to use it to effect a monophonic, pre-amplified guitar that's being played into stereo cabinets. You also want to record the **Backward Garden** effect to ADAT channels 7 and 8. Our routing configuration looks like the diagram above. Note that H8000FW extra inputs and outputs are not shown, in the interest of making it remotely readable.

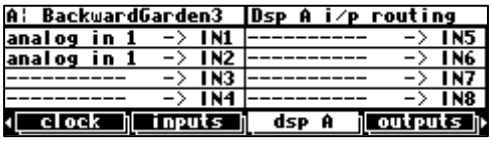
Let's run through how we'd actually set this up!

Starting with the input block, we need to make sure the **S/P DIF** inputs are enabled. Do this at the "bottom" **inputs** menu page in the SETUP area.

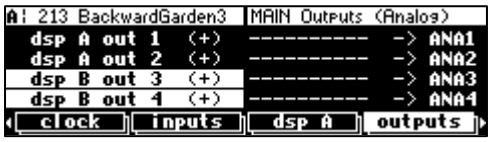
Then we need to make sure the appropriate ***MAIN Inputs*** are selected. Do this at the "top" **inputs** menu page in the SETUP area. We're not planning on using input 2 so it doesn't really matter what gets assigned there!

Now, we need to assign the ADAT, S/P DIF, and AES/EBU inputs to the first six inputs of DSP B. Do this at the **DSP B** menu page in the SETUP area (it's "below" the **DSP A** menu

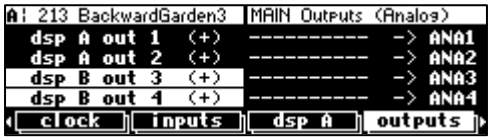
page!). Strictly speaking, assigning silence (**----------**) to the last two inputs isn't really necessary since we don't plan to use those outputs …



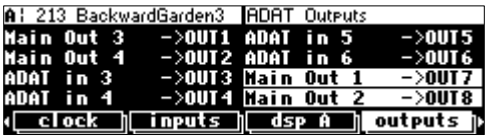
Now, we need to assign analog input 1 to DSP A's inputs 1&2. Do this at the **DSP A** menu page in the SETUP area. Again, assigning silence to the remaining inputs isn't necessary because **Backward Garden** only has two "live" inputs (its "I/O identifier" is **22**).



Cool. Let's assign the analog outputs now at the **outputs** menu page in the SETUP area. We want DSP A outputs 1&2 at analog out 1&2 to send to the stereo cabinet. Although we're not actually using analog outputs 3&4, we still need to assign DSP B outputs 1&2 to them so that the ADAT outputs can "tap" these signals.



Now let's assign the AES/EBU outputs at the **outputs** menu page. The first four AES/EBU outputs are DSP B outputs 3-6. Recall that the S/P DIF outputs simply "tap" AES/EBU outputs 1/2, in this example, **dsp B out 3** and **dsp B out 4**.



Finally, let's assign the appropriate signals to the ADAT outputs. Do this at the "bottom" **outputs** menu page in the SETUP area. Notice that ADAT inputs are also connected to the ADAT channels that we weren't interested in using (3 through 6). We probably didn't need to … H8000FW owners can set up AES11-18 and the FIREWIRE outputs in the same way.

And that's it! Once you get the hang of it, making custom routing configurations is no sweat! When you are happy with things, don't forget to save the routing (see next section).

Storing and Loading Routing Configurations

Nevertheless, you don't have to wrestle with all those parameters every time you want to change the routing configuration. As you'll recall, in the ***Overview and Quickstart*** section we used the Routing Storage area for loading entire routing configurations in one go. In addition to loading the preset routing configurations that came with the H8000FW, you can also save your own configurations for future use.

→ Block diagrams and descriptions of the preset routing configurations can be found in *Loading Routing Configurations* on page 25.

Access the Routing Storage area by holding down the PROGRAM key for one second. The LED next to the PROGRAM key will begin to blink and the upper right-hand portion of the screen will read "**Routings**." Here we find several SOFT KEYS:

list Lists the routing configurations.

← and → Jumps between decades or the alphabet depending on the status of the **Sort by** parameter in the **Criteria** menu page.

Criteria Determines the behavior of the **list**. Will routing configurations be presented numerically or alphabetically? Will you be able to view "factory" configurations? "User" configurations? Configurations on Memory Cards?

Save Saves routing configurations without overwriting original configuration. You have the option to rename the configuration.

update Saves routing configurations to User Memory with a single key press.

remove Deletes the selected routing configurations from User Memory or Card.

These SOFT KEYS behave exactly as they do in the PROGRAM area.

→ See *Loading Programs* on page 125, *Saving a Program* on page 129, and *Deleting a Program* on page 132 for more details.

→ To change the one second hold time," see *Miscellaneous Setup Options* on page 140.

The parameters on the following routing and levels menu pages are saved in the Routing Storage area:

- SETUP / **dsp A** used to assign "sources" for DSP A.
- SETUP / **dsp B** used to assign "sources" for DSP B.
- SETUP / **inputs** used to assign "sources" to the "input block."
- SETUP / **outputs** used to assign "sources" to the outputs.
- SETUP / **format** used to define digital protocols for AES/EBU and S/P DIF inputs and outputs.
- LEVELS / **dsp A** used to adjust the Wet/Dry mix for DSP A, the output levels for DSP A, and the input levels for DSP A.

- LEVELS / **dsp B** used to adjust the Wet/Dry mix for DSP B, the output levels for DSP B, and the input levels for DSP B.

Notice that the analog and digital input levels located on the LEVELS / **inputs** menu page and the analog and digital output levels located on the LEVELS / **output** menu page, are not saved in the Routing Storage area. This is because these are usually set according to the external signal sources and destination, and not changed according to the preset or routing..

Loading a Routing Remotely Via MIDI

To load a routing remotely, make sure **MIDI** is **enabled**, **program load** is **on**, and **omni mode** is off on the **midi** menu page in the SETUP area. Routings will load in response to program change messages on the MIDI channel that corresponds with **base channel** + 2.

In the example above, **base channel** is set to **1**. So, if we send the program change message "12" on MIDI channel 3 (1 + 2), we would load the routing **Analog B->A**. You can also load programs on DSP A using (**base channel** + 0) and on DSP B using (**base channel** + 1).

→ See *Loading a Program Remotely* on page 125 for more details.

Programs' Effect on Routing Decisions

As you'll recall from the ***Quickstart*** section, to the right of every program name in the PROGRAM area there are two digits called the "I/O Identifier." On the screen shown to the right:

"**Q*10 Grafic Eq**" has an "I/O Identifier" of "**44**"

"**O*5 Grafic Eq**" has an "I/O Identifier" of "**88**"

"**Gaspodes Dly_2**" has an "I/O Identifier" of "**32**"

"**Gaspodes Dly_M**" has an "I/O Identifier" of "**22**"

To understand why the "I/O Identifier" is necessary, we must first understand that, although each DSP has eight inputs and eight outputs, it is not necessarily the case that all of those inputs and outputs will be used by a given program. As has been stated elsewhere in this manual, each program is a unique algorithm. The particulars of a given algorithm dictate how many inputs and outputs will be used, just as they dictate what sorts of parameters are used. For example, a program that acted as a synthesizer would not need any inputs. A program that turned a mono signal into a pseudo-quad signal would only need one input. A program that modulated one stereo signal with another stereo signal would only need two outputs.

So, the "I/O Identifier" tells us at a glance how many inputs and outputs a program uses. The first digit refers to the number of active (live) inputs to the program, and the second digit refers to the number of active (live) outputs to the program. The way these digits correspond to actual inputs and outputs is as you would expect:

0 x the program has no inputs. It could be an oscillator or sound effects generator.

1 x input 1 is live; inputs 2, 3, ..., 8 are dead.

2 x inputs 1 and 2 are live; inputs 3, 4, ..., 8 are dead.

and so on!

x 0 the program has no outputs. Perhaps it's a spectrum analyzer.

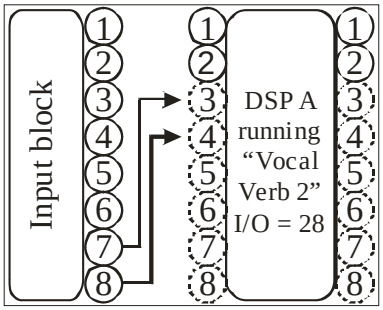
x 1 output 1 is live; outputs 2, 3, ..., 8 dead.

x 2 outputs 1 and 2 are live; outputs 3, 4, ..., 8 are dead.

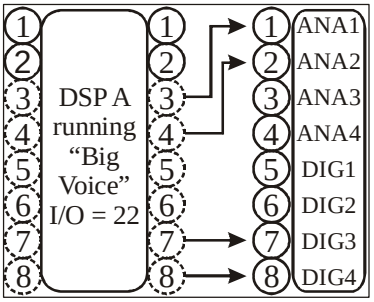
and so on.

If the I/O Identifier is not visible, this means ***either*** that the program has no inputs or outputs (unlikely, except for a small number of information-only presets) ***or*** that the program file does not contain I/O Identifier information - this will usually only apply to presets obtained from a DSP4000 or other earlier system.

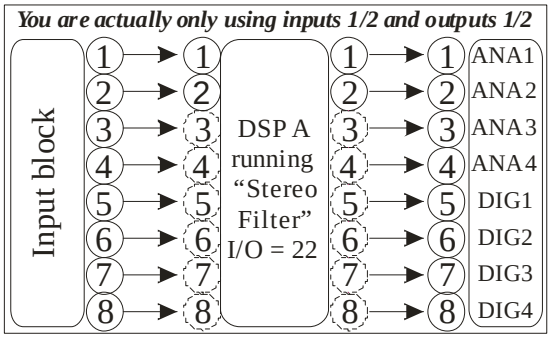
Be mindful of the "I/O Identifiers" when you select your programs and routing configurations. You won't want to make connections to dead inputs or outputs *unless you plan not to use those dead inputs or outputs*! You may find yourself frequently ignoring dead inputs or outputs, especially if you load *quad* or *octal* routing configurations but only process *stereo* signals. As long as you don't fool yourself into thinking the dead inputs or outputs are passing audio, everything is OK! Let's look at a few examples of routing configurations that *rely* on connections to dead inputs and outputs and, because of that reliance, fail to do any business.



For example, the setup shown to the right is bad news. The inputs to DSP A will never be heard because the program "**VocalVerb 2**" doesn't use DSP inputs 3 and 4! Remember, the first digit in its "I/O Identifier," "**2,**" means that only inputs 1 and 2 are live. Inputs 3 through 8 are dead (they're shown as dotted circles in the diagram). You won't hurt the H8000FW by hooking things up this way, but you won't pass audio!



To the right, we have another bad scene. The program "**Big Voice**" has an "I/O Identifier" of "**22.**" That means that only DSP outputs 1 and 2 are live. Outputs 3 through 8 are dead, but in the block diagram to the right, it is these dead outputs that are being used. Again, you won't hurt the H8000FW by hooking things up this way, but you won't pass audio!



Of course, making a connection to a dead input or output is not *necessarily* a bad thing. You can make "dead connections" as long as you don't fool yourself into thinking that they're actually passing signals. For example, you might want to filter a simple stereo signal. You'll use digital inputs 1 and 2 and digital outputs 1 and 2. You don't care what's happening on the rest of the

digital inputs and outputs. You load the program "**Stereo Filter**" with an "I/O Identifier" of "**22.**"

For convenience, you load the routing configuration "**AES 8 track A only**," which makes connections as shown above. Connections are in fact made to the dead inputs 3 through 8 and the dead outputs 3 through 8, but it doesn't matter in this case. You aren't attempting to pass signals on these "dead connections" ! You're only *using* the live inputs 1 and 2 and the live outputs 1 and 2. Again, making a "dead connection" isn't a bad thing as long as you don't fool yourself into thinking that it's actually passing a signal!

The moral? Not all the inputs and outputs on a given DSP are necessarily live. Exactly how many *are* live depends on the program that is being run. To prevent signals from becoming "lost," keep the "I/O Identifier" and its impact on your routing configuration in mind!

Before we leave this section, we should mention that, although we just asked you to always keep the "I/O Identifier" in mind, you will seldom need to alter a chosen routing configuration to suit a program *in practice*. You'll find that things tend to work out better than the "bad news" examples above might lead you to believe!

The Level Meters

Now that you're comfortable routing signals in the H8000FW, we can explore the Level Meters. Once you understand the Level Meters, you can adjust levels along the signal path. There are eight individual meters to the left of the display. By altering the **Source** parameter on the **meter** menu page in the LEVELS area, you can change the point in the signal path that the meters measure. Your choices are:

inputs measure the level at the input block (as defined on the **inputs** menu page in the SETUP area). In **post-fade** mode, the meters reflect level cuts made on the **inputs** menu page in the LEVELS area. In **pre-fade** mode, the meters do *not* reflect these cuts.

machine in measures the level at the inputs to the currently displayed DSP. To measure the level at the inputs to the DSP *not* currently displayed, press the PROCESSOR A/B key. In **post-fade** mode, the meters reflect level cuts made on the **dsp A** or **dsp B** menu page in the LEVELS area. In **pre-fade** mode, the meters do *not* reflect these cuts.

machine out measures the level at the outputs to the currently displayed DSP. To measure the level at the outputs to the DSP *not* currently displayed, press the PROCESSOR A/B key. In **post-fade** mode, the meters reflect level cuts made on the **dsp A** or **dsp B** menu page in the LEVELS area. In **pre-fade** mode, the meters do *not* reflect these cuts.

outputs measure the level at the AES/EBU outputs (H8000) or at the analog and AES/EBU outputs (H8000A, H8000FW). The S/P DIF output level is equivalent to AES/EBU 1/2 and in the H8000 the analog output level is 7/8. The ADAT output levels depend on which outputs were assigned to which ADAT outputs. The levels reflect cuts made on the **outputs** menu page in the LEVELS area (there is no **post-fade**/**pre-fade** distinction when monitoring the outputs).

The **order** parameter determines the order of signals. Usually you will leave this at **1-4, 5-8**. Your other option is to "flip" the first and last four inputs/outputs on the meters: **5-8, 1-4**. This is mostly useful for viewing an 8-channel signal on an Eve/Net™ remote with 4-channel metering.

The parameter **decay time** determines how long the meters take to go from full "deflection" to zero measuring an impulse. The parameter **peak hold** determines how long the meters hold their highest reading.

The Level Meters are useful for two reasons. First, you can use them to verify that your internal gain structure is in good shape. You generally want to keep levels near, but not touching, the red clip LED. To achieve this, it's always better to boost or cut an *output*. Only if a signal level cannot be optimized by an output boost/cut should you resort to altering an input level! Second, the Level Meters can be used to troubleshoot routing problems. If, for example, you hear nothing at the output of the H8000FW, and you *think* your signal path goes from the analog inputs to DSP B to DSP A to the digital outputs, you can use the Level Meters to check that signal exists at every point along the way. The point in the path at which the signal "dies" will clue you in to what routing or level parameter has been set incorrectly.

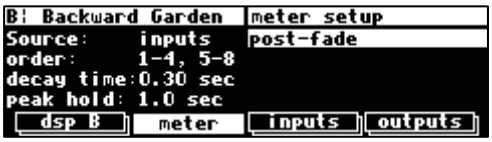
→ Don't forget about the "I/O Identifier" when troubleshooting. See ***Programs' Effect on Routing Decisions*** on page 71.

Controlling the Level of the Analog and Digital Inputs

Signals come into the H8000FW from the outside world via the input block. Adjust the boost/cut of each of these eight inputs on the **inputs** menu page in the LEVELS area. Such boost/cuts will often be made in "gangs." However, you can boost/cut any of the eight inputs independently of the others by pressing the DOWN CURSOR key. *Note: These settings are not saved or loaded with routing configurations in the Routing Storage area.*

→ See Ganged Parameters on page 20 for more about "gangs."

The "top" menu page (shown above for the H8000FW) makes cuts of 0dB to 100dB in the digital domain. Any cuts made to the analog input on the "top" page are *after* digital conversion. The "bottom" menu page (shown to the right for the H8000) makes analog boosts/cuts of +30dB/-90dB in the analog domain before conversion. Except in rare instances, it is usually preferable to optimize the analog input signal level on the "bottom" menu page, that is, *in the analog domain*.



To monitor the input levels, go to the **meter** menu page in the LEVELS area. Change **Source** to **inputs**. Select **post-fade** if you would like to monitor levels after the aforementioned cuts. Select **pre-fade** if you would like to monitor levels before the aforementioned cuts.

It is possible to *overdrive* an input to the H8000FW, decrease that overdriven level at the **inputs** page, and *show no clipping* on the Level Meters when viewing **post-fade**! To avoid such a situation, it is advisable that you boost/cut the signals coming into the H8000FW at their source. Doing so also results in a better gain structure! The moral? Use the boost/cut on the **inputs** page only as a last resort.

→ Note: All of the parameters discussed in this section can be "remote controlled" via MIDI or the foot pedal jacks. To learn how, read:

Setting Up the External Controllers on page 94.

External Modulation and Trigger Menu Pages on page 98.

Remote Controlling Parameters on page 113.

Input Levels, Wet/Dry Ratios, and Output Levels for Each DSP

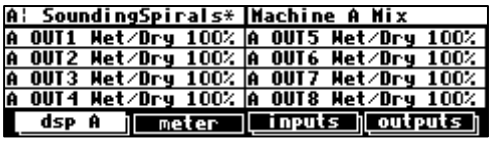
You can control the input level for each input of each DSP, the wet to dry ratio of each "channel" of each DSP, and the output level for each output of each DSP. All of these settings are saved and loaded with a routing configuration in the Routing Storage area.

→ See *Signal Flow Example* on page 66.

The input level for each input of DSP A is controlled on one of the many "stacked" **dsp A** menu pages in the LEVELS area. You can cut the input signal from 0 to -100 dB. By pressing the DOWN CURSOR key to "un-gang" the parameters, cuts can be made on single inputs independently of the others.

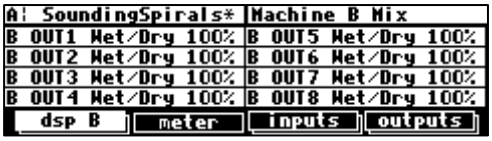
The input level for each input of DSP B is controlled on the **dsp B** menu page located "below" the **dsp A** menu page in the LEVELS area. Again, you can cut the input signal from 0 to -100 dB. By pressing the DOWN CURSOR key to "un-gang" the parameters, cuts can be made on single inputs independently of the others.

To change the wet to dry ratio for each "channel" of DSP A, find the appropriate menu page in the **dsp A** menu page "stack" in the LEVELS area. At **100%**, the signal coming out of an output is completely processed. At **0%**, the signal coming out of an output is identical to the signal applied to the corresponding input. For example, if you set **A OUT2 Wet/Dry** to **0%**, the signal at DSP A output 2 will be the same as the signal at DSP A input 2. A setting between **0%** and **100%** mixes the processed and input signals as you would expect. Pressing the DOWN CURSOR key "un-gang" the parameters and allows you to control the Wet/Dry ratio of any "channel" independently of the others.



Use of the word "dry" may cause some confusion. Normally, if you set an effects box to "dry," the output of the box is the same as its input. However, the "Wet/Dry" control on the H8000FW is *not* at the box level, it's at the DSP level. To understand the ramifications of this, pretend we're sending a signal from the "inputs block" to DSP B. The program loaded on DSP B is a dense reverb and the **OUTx Wet/Dry** parameters for all eight outputs of DSP B are set to **100%** (the output is totally processed). Now, let's say you connect all eight outputs of DSP B to the inputs of DSP A. That would mean that the signals at the inputs to DSP A are reverberant. Now, let's say you set the **OUTx Wet/Dry** parameters for all eight outputs of DSP A to **0%** (not processed at all). DSP

A's outputs would be identical to its inputs: reverberant - not the sort of signal we'd normally call "dry" ! The important thing to realize is that the Wet/Dry ratio control for each DSP is *relative to that DSP*. It might be better thought of as a "Wet/Bypass" ratio!



The Wet to Dry ratio control for DSP B can be found on the appropriate **dsp B** menu page located "below" the **dsp A** menu page in the LEVELS area. To access the **dsp B** menu page, either press the **dsp A** SOFT KEY a few times or press the PROCESSOR A/B key. The **dsp B** menu page operates just as the **dsp A** menu page does.

It is worth noting that the Wet/Dry controls do not operate as normal "balance controls." From 100% wet to 50% wet/dry the wet signal reduces while the dry signal is constant. The opposite applies from 50% down to 0%. This gives a more useful control function, with no 6dB dip or peak at the center setting.

Finally, we can cut the level of each output of each DSP if we so desire. This is done on the appropriate **dsp A** or **dsp B** menu pages in the LEVELS area. The **dsp B** menu page is located "below" the **dsp A** menu page. Output levels can be cut from 0 to -100 dB. By pressing the DOWN CURSOR key to "un-gang" the parameters, individual output levels can be adjusted independently of the others.

→ Note: All of the parameters discussed in this section can be "remote controlled" via MIDI or the foot pedal jacks. To learn how, read:

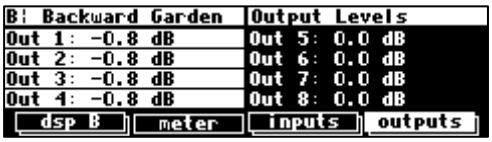
Setting Up the External Controllers on page 94.

External Modulation and Trigger Menu Pages on page 98.

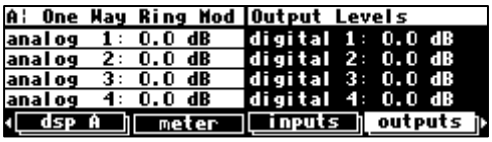
Remote Controlling Parameters on page 113.

Controlling the Level of the Analog and Digital Outputs

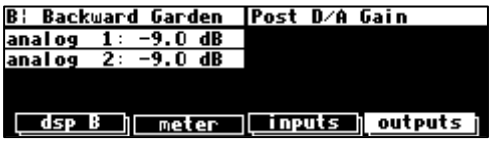
You can control the level of the analog outputs and the digital outputs. These adjustments are made to match the H8000FW's output levels to other equipment, and would not normally be used as level controls. You should leave these levels set at 0dB where possible in order to get the best possible audio performance.



To adjust the level of the outputs from -100dB to 0dB, go to the **output** menu page in the LEVELS area. If you're using the analog outputs *on an H8000 (not* an H8000A or *H8000FW)*, **Out 7** and **Out 8** control the level *before digital to analog conversion*. Unless you have a good reason for doing otherwise, leave these at zero!



If you're using the analog outputs *on an H8000FW (not an H8000)*, explicit **analog** parameters control the level *before digital to analog conversion*. Again, unless you have a good reason for doing otherwise, leave these at zero!



A better place to adjust the analog output level -90 to 3 dB is on the "bottom" **outputs** menu page in the LEVELS area. These adjustments are made after the *digital to analog conversion*. Making your adjustments "post D/A" will generally result in lower noise and distortion than making them "pre D/A."

→ Note: These parameters can be "remote controlled" via MIDI or the foot pedal jacks. To learn how, read:

Setting Up the External Controllers *on page 94.*

External Modulation and Trigger Menu Pages *on page 98.*

Remote Controlling Parameters *on page 113.*

Digital Setup

Note to H8000FW users: many of the screen shots in this section are taken from the H8000. Your screens will differ insofar as you have four plus eight AES/EBU inputs and outputs, not eight. This discrepancy shouldn't matter.

DIGITAL SETUP OVERVIEW

Before we look at the H8000FW's digital setup in detail, let's take in the "big picture."

- The H8000FW sports twelve AES/EBU inputs/outputs, two S/P DIF inputs/outputs, and eight ADAT input/outputs as well as 16 channels of FireWire.
- All of the H8000FW's analog to digital conversion and digital to analog conversion is 24 bit.
- Only eight external inputs can be connected to DSP A and B.
- Whatever signal is sent to AES/EBU output 1/2 is also sent to S/P DIF output 1/2.
- Whatever signal is sent to AES/EBU output 11/12 is also sent to S/P DIF output 3/4.
- The H8000FW assumes that signals at the digital inputs are 24-bit. No harm occurs if the input is in fact less than 24-bit; subsequent processing will usually fill the lower bits.
- The *system sampling rate* is derived from either an internal clock or an external clock.
- The internal clock rates supplied by the H8000FW include 44.1kHz, 48kHz, 88.2kHz, 96kHz (*note that 32kHz and 44.059kHz are not supplied).*

Unless the sample rate conversion option is ON ("bottom" page under ***[clock]*** *in the* SETUP area*), you must ensure that any signal at the AES/EBU 1-4 inputs or S/P DIF 1-2 inputs is synchronized to the system sampling rate.*

You must always ensure that ADAT and AES11-17 inputs are synchronized to the system sampling rate – these have no available sample rate conversion.

- On the H8000FW, the external clock may be taken from AES/EBU inputs 11-17, S/P DIF inputs 3/4 or the ADAT or FireWire inputs. If they are used, AES/EBU inputs 1-4 and S/P DIF inputs 1/2 must be synchronized to the

system sampling rate, from wherever it is derived, or *sample rate conversion* must be enabled.

- The digital outputs are at the *system sampling rate*, and all analog to digital and digital to analog conversion is done at the *system sampling rate*.

S/P DIF

The digital inputs 1/2 are received at either the AES/EBU 1/2 input jack or the S/P DIF 1/2 input jack. To select between the two, use the **DIN 1/2** parameter on the "bottom" **inputs** menu page in the SETUP area.

The digital outputs 1/2 are sent out at both the AES/EBU 1/2 output jack and the S/P DIF 1/2 output jack. To select between the two *formats*, use the **DOUT 1/2** parameter on the "bottom" **format** menu page in the SETUP area. To be clear, signals will be present at both the AES/EBU 1/2 output and the S/P DIF 1/2 output, but they can only be one *format*. **S/P DIF** selects a "consumer" format while **AES/EBU** selects a "professional" format. Use the **AES/EBU** format unless you have a compelling reason to do otherwise.

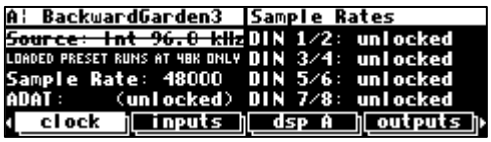
***Note**: The digital inputs 1/2 need not be assigned to the same protocol as the digital outputs 1/2. In other words, digital inputs 1/2 can be received at the AES/EBU 1/2 input jack and digital outputs 1/2 can be sent via the S/P DIF protocol, or vice-versa.*

Similarly, on the H8000FW, S/P DIF inputs 3/4 can be used in place of AES 11/12. Their protocols are fixed.

→*See* ***DIN 11/12 allows the choice of either AES/EBU or S/P DIF for AES11/12.*** *on page 63.*

SAMPLING RATES

The H8000FW can operate over a range of sampling rates, from 32kHz to 100kHz. Because the higher sampling rates demand more of the signal processing resources, some large presets will not operate at the higher rates. These are identified by the absence of the "$^{9}_{6}$" symbol.



If one (or two) of these large presets is loaded, the H8000FW will not allow **Int 88.2** or **Int 96kHz** to be selected and will not lock to any digital source above 50kHz. It may be necessary to unload both A and B presets before a higher sampling rate can be selected.

Similarly, if one of these higher clock rates is selected, or the system is locked to a digital source above 50kHz, the H8000FW will not allow these larger programs to be loaded.

In effect, the H8000FW has two "speeds," a bit like gear ratios on a car. In the normal (lower) speed range, all presets can run, but only sampling rates between 32kHz and 50kHz may be used.

In the higher speed range, some presets cannot run (those which do not have the "$^{9}_{6}$" symbol beside their name on the program screen (e.g., **Quad*16 Grafic Eq** and **Stereo*32 Grafic Eq** in this screen shot), but the whole sampling rate range may be used.

Note that because the ADAT protocol does not support the higher sampling rates, ADAT inputs and outputs are unusable at 88.2kHz and 96kHz on the H8000 and H8000A.

The H8000FW (but not H8000, H8000A) supports the SMUX protocol, allowing the ADAT inputs to pass four channels at 96kHz.

The System Sampling Rate – A Digital Audio Primer

All digital audio systems operate by expressing the value of the audio signal at any instant in time as a (digital) number. This number is sampled (recalculated) at regular very short intervals. The rate at which the value is sampled is known as (wait for it) the *sample rate*, sometimes known as a *clock*.

All the internal parts of the H8000FW family (including the A/D and D/A converters and the digital outputs) run at a single sample rate, known as the *system sampling rate*. This rate may be determined either by an *internal* clock, or by a single *external* input. If any external input is used as an audio source, it must have exactly the same sample rate as the system sampling rate, or things will get out of step, causing one or more of the digital values to be lost. This will result in clicks or distortion – a bad thing. For example, at a sample rate of 96kHz, an 0.001% difference (10 parts per million – more accurate than most clock sources) will cause a (probably faint) click about every second.

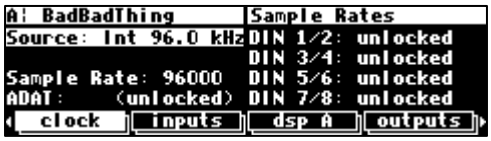
A very small difference in sample rates, as in the example above, results in *slipping*, meaning that the sample points "slip" past each other in time. Depending on how severe the sample rate difference is, the results may be inaudible (slight clicks will be 'masked' by the signal) but will be avoided by all those interested in audio quality.

Since it is unlikely that pure chance will allow any two or more external signals to have exactly the same sample rate, it is necessary to *synchronize* (lock) them, meaning that the external signals derive their sample rate from some common reference. This may be either a signal from the H8000FW itself, or an external signal feeding the H8000FW. It is good

studio practice to establish a central high quality clock source, to which all the digital audio equipment is synchronized, usually by Word Clock.

The H8000FW family's digital inputs AES1-4 (and AES5-8 on the H8000) incorporate optional sample rate conversion, where new digital values are "made up" to fill in the gaps caused by a difference in sample rates.

Using the Internal Clock



When you use the "internal" clock, the *system sampling rate* will be that of the internal clock. Unless sample rate conversion is on ("bottom" page under **clock** in the SETUP area), *slipping* will occur on any digital inputs unless they are externally locked to one of the H8000's digital outputs. The ADAT (and AES11-18 and FireWire on the H8000FW) inputs have no sample rate conversion and thus cannot be used with an internal clock unless the external unit is synchronized to the H8000FW's digital outputs.

→ See *The Status of The Digital Inputs When Using the Internal Clock* on page 84.

Selecting the Internal Clock's Rate

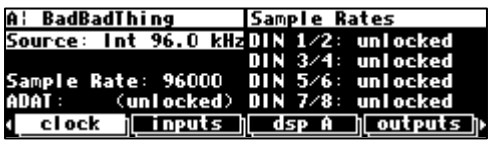
To select the internal clock, set the **Source** parameter on the **clock** menu page in the SETUP area to **Int 44.1 kHz**, **Int 48.0 kHz**, **Int 88.2 kHz**, or **Int 96.0 kHz**:

44.1 kHz The rate of standard compact disks. The "44.1kHz sample rate indicator" is illuminated. The highest reproducible audio frequency is ~20kHz.

48 kHz The "professional" or "broadcast" rate. The highest reproducible audio frequency is ~22kHz.

88.2 kHz Twice the rate of standard compact disks. This raises the highest possible reproducible audio frequency to ~40 kHz. The cost of these "20k +" overtones is a reduction in the size of the programs the H8000FW can run. Some programs will be "unloadable" when **88.2 kHz** is selected. Similarly, if one of these programs is loaded, you will not be able to select **88.2 kHz**.

96 kHz The current "professional rate," commonly used in DVD production. This raises the highest possible reproducible audio frequency to around 44kHz. Some programs will be "unloadable" when **96 kHz** is selected.



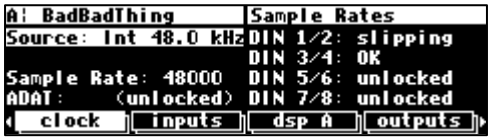
The *actual* value of the system sampling rate can be read in the field that reads, "**Sample Rate: xxxxx**." This will be accurate to the nearest Hz.

Of course, if you select one of the fixed rates (**44.1 kHz**, **48 kHz**, **88.2 kHz**, or **96 kHz**), the *actual* rate will be the same as the rate you select.

Note that when an H8000FW is connected by FireWire to a running computer, the **Source** parameter cannot be changed – you should change it from your DAW or other application to be sure that they remain the same. They may also be changed from the computer Control Panel, but this may cause trouble with some applications.

→ See *Miscellaneous Setup Options* on page 140 for other sync options.

The Status of The Digital Inputs When Using the Internal Clock



When using the internal clock, the sampling rates of the signals at the digital inputs must be exactly equal to that of the internal clock (unlikely) or sample rate conversion must be turned on under the "bottom" clock menu page in the setup area.

The upper right-hand side of the clock menu page in the SETUP area displays the status of the digital inputs. DIN 1/2 reflects the status of the digital inputs 1/2 (either AES/EBU 1/2 or S/P DIF 1/2 depending on DIN 1/2 on the inputs menu page). DIN 3/4 reflects the status of the digital inputs 3/4 and so on. Not surprisingly, ADAT reflects the status of the ADAT input.

The status of the digital inputs will be

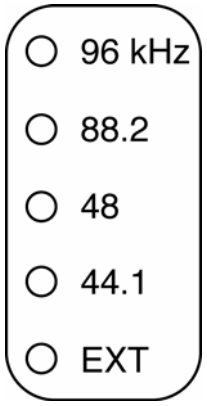
slipping signals are present, but their sampling rate is close to but not *locked* to the system sample rate. As described above, this may cause clicks or distortion. When the external signal is very close to the internal rate, the status indicator may flicker between **slipping** and **OK**. Some slipping may be acceptable for monitoring or other non critical applications, but in general, the greater the difference between the system sample rate and that of the digital input, the greater the distortion. Of course, you can always just turn on the sample rate converter for the AES/EBU 1-4 and S/P DIF 1-2 inputs. No sample rate conversion exists for the other external inputs so these should not normally be used if **slipping**.

OK signals are present, and their sampling rate is locked to the internal clock rate. All is good !

unlocked either no signals are present, their sampling rate is very unstable, or something is dreadfully wrong with them.

If the words **slipping** or **unlocked** are in parentheses (as shown above for the **ADAT** inputs), this means that the respective inputs are not *routed* (not connected to any inputs and hence unused) and that the indication can be ignored.

Understanding the "System Sampling Rate and External Sync Indicator" When Using the Internal Clock



The "System Sampling Rate and External Sync Indicator" is the box of five LEDs immediately to the left of the display. The top four LEDs indicate the status of the system sampling rate:

Solidly Lit: When one of the top four LEDs is solidly lit, the system sampling rate is exact *(+/- 0.05%) (the LED corresponding to the system sampling rate will illuminate).*

Blinking: When one of the top four LEDs is blinking, the system sampling rate is between one of the fixed rates (*the LED corresponding to the nearest sampling rate will blink*).

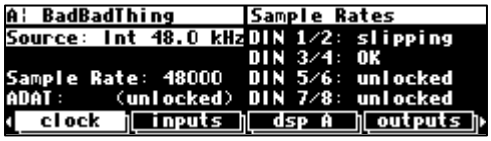
Of course, if you select one of the fixed rates (**44.1 kHz**, **48 kHz**, **88.2 kHz**, or **96 kHz**), the LED corresponding to your selection should light solidly.

The bottom LED, EXT, has four possible states:

Not lit at all: When the bottom LED is not lit at all, none of the digital inputs are *routed*. This would happen only if the DSP A and DSP B inputs and the main outputs were either unconnected or only connected to the analog inputs - no digital signals whatsoever!

Solidly lit: When the bottom LED is solidly lit, the sampling rates of all *routed* digital inputs are locked to the internal clock rate and all is good. This should be the normal state.

Blinking regularly: When the bottom LED is blinking *regularly*, at least one (and maybe more than one) *routed* digital input is unlocked. Use the right-hand side of the **clock** menu page in the SETUP area to see which digital inputs are in fact **unlocked**. As before, you can ignore those in parentheses ( ).



Blinking irregularly: When the bottom LED is blinking *irregularly*, at least one (and maybe more than one) *routed* digital input is "slipping" relative to the internal clock. Use the right-hand side of the **clock** menu page in the SETUP area to see which digital inputs are in fact **slipping**.

Digital inputs that are not *routed* (i.e., are not connected to "inputs block" or AES outputs) will not affect the status of the EXT LED.

→ See *The Comprehensive Input / Output Scheme* on page 51.

Using an External Clock

When you use the "external" clock, the *system sampling rate* will be that of the external digital signal. The system sampling rate is the sampling rate used for all internal processing. The external clock's sampling rate is derived from the digital inputs shown in the table below, or the word clock input. Unless sample rate conversion is on ("bottom" **clock** menu page in the SETUP area), you must ensure that AES/EBU inputs 3/4 (and 5-8 on H8000), if used, are synchronized to the selected clock input. Since no sample rate conversion exists for the ADAT, AES 11-17 and FireWire inputs, you must ensure that they are either synchronized to the source of the external clock or are in fact the source of the clock.

→ See *Miscellaneous Setup Options* on page 140 to enable/disable Word Clock input.

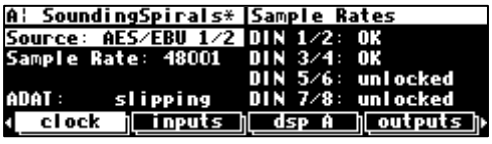
→ See the *H8000FW FireWire Interface* section for more information on using the H8000FW with a PC or Mac.

H8000	AE S1/2	SPDIF 1/2		ADAT
H8000A	AE S1/2	SPDIF 1/2		ADAT
H8000FW	AES11-17	SPDIF 3/4	OPTO 1/2	ADAT

Note: If the clock source is "unlocked" (not connected to a valid digital source), the external clock will be **invalid**. If the external clock is invalid, the system sampling rate will revert to the last valid *internal* clock rate.

Selecting the External Clock

The external clock is derived from the inputs shown in the table above, or the word clock input. It cannot be derived from any other digital inputs.



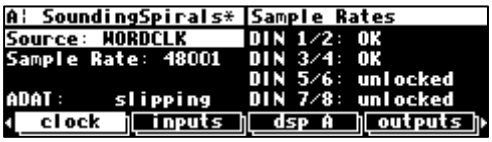
To set the system sampling rate to the external clock's rate, set the **Source** parameter on the **clock** menu page in the SETUP area to one of the available options. *(S/P DIF and OPTO will be available if selected under the [inputs] menu page).*

The system sampling rate will now be the sampling rate of the selected external input.

Alternatively, you can **use Word Clock** as a clock source. H8000/H8000A users must enable Word Clock before use, on the **misc** or **clock** menu pages respectively in the SETUP area.

Word Clock is always enabled on H8000FW, so it need not be enabled.

Then you can select **WORDCLK** as the external clock source on the **clock** menu page in the SETUP area.



The rate of the external clock is displayed in the "**Sample Rate: xxxxx**" field. In the example shown two screens above, the *actual* frequency of the external signal is **48001**Hz. External sampling rates can range from ~30kHz to 53kHz and 61kHz to ~99kHz.

→ See *Sampling Rates* on page 81 for information on speed modes.

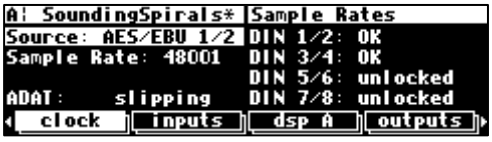
→ See *Word Clock Termination* on page 90 for information on connecting Word Clock.

Selecting a clock source when connected to a computer (H8000FW only)

When an H8000FW is connected to a computer by FireWire, the clock source is set by the computer and the **source** control on the H8000FW is disabled. This is because it is important that the computer and the H8000FW remain synchronized.

The Status of the Digital I/Os When Using the External Clock

The right-hand side of the **clock** menu page in the SETUP area displays the status of the digital inputs.



DIN 1/2 reflects the status of the digital inputs 1/2 *(either the AES/EBU 1/2 input jack or the S/P DIF 1/2 input jack depending on IN 1/2 on the [inputs] menu page).*

DIN 3/4 (and **DIN 5-8** on the H8000) reflect the status of the remaining XLR AES/EBU inputs. If you intend to use these inputs, you must ensure that these inputs are synchronized to the external clock source, as shown by the **OK** indication on the right hand side. **ADAT** reflects the status of the ADAT inputs - you must ensure that the ADAT inputs are synchronized to the external clock source if they are being used. Typically, when using ADAT, your clock source will be either the ADAT signal itself, or a WORDCLOCK to which the ADAT is also synchronized.

The H8000FW also shows the status of **AES11-18** and **FIREWIRE 1-2** – the same synchronization requirements apply.

The status of the digital inputs will be:

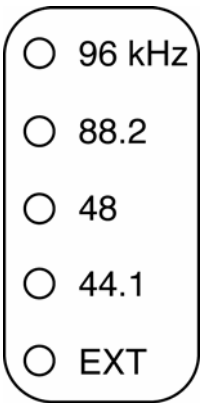
slipping **DIN 1/2** will read **slipping** if its sampling frequency changes suddenly or if it is unstable. This means that signals are present, but they are not synchronized with the external clock input. The greater the discrepancy between the external clock and the input, the greater will be the distortion. Slight slipping can be acceptable in non-critical applications, as the occasional clicks it produces are often masked by the source material. Better, however, to enable sample rate conversion where available and be rid of it.

OK the input is synchronized to the external clock source and everything is cool.

unlocked no signals are present, the signals' sampling rate is changing suddenly, the signals' sampling rate is very unstable, or something is dreadfully wrong with the signals.

The sampling rate at the digital outputs will be the same as the sampling rate of the external clock (which is the system sampling rate in *external*). A/D and D/A conversion will be done at this rate.

Understanding the "System Sampling Rate and External Sync Indicator" When Using the External Clock

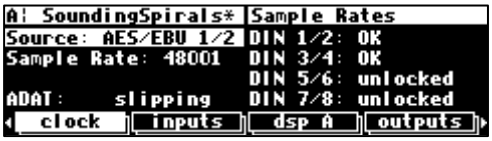


The "System Sampling Rate and External Sync Indicator" is the box of five LEDs immediately to the left of the display. The top four LEDs indicate the status of the system sampling rate:

Solidly lit: When one of the top four LEDs is solidly lit, the system sampling rate is exact (+/- *0.05%*) (*the LED corresponding to the system sampling rate will illuminate*).

Blinking: When one of the top four LEDs is blinking, the system sampling rate is between one of the fixed rates (*the LED corresponding to the nearest sampling rate will blink*).

Use the "**Sample Rate**" field on the **clock** menu page in the SETUP area to see the *actual* sampling rate (e.g., **48001**Hz in the example to the right).



The bottom LED, EXT, has two possible states:

Solidly lit: When the bottom LED is solidly lit, all of the routed digital inputs are locked and all is right with the world.

Blinking regularly: When the bottom LED is blinking *regularly*, at least one (and maybe more than one) *routed* digital input is unlocked (i.e., not synchronized to the external clock). Use the right-hand side of the **clock** menu page in the SETUP area to see which digital inputs are in fact **unlocked**.

To check which digital inputs are routed, consult the routing menu pages discussed in Routing Configuration on page 55.

Sample Rate Conversion (SRC)

In general you need to make sure that any digital inputs are synchronized to the system sampling rate.

If for any reason you cannot synchronize the AES/EBU 1-4 (1-8 on H8000) or S/P DIF 1/2 digital inputs to the system sampling rate, use sample rate conversion (SRC). The sample rate conversion pages are the "bottom" menu pages under **clock** in the SETUP area. By turning **SRC Mode on** for the appropriate digital input, the H8000FW will adjust the input sampling rate to match the system sampling rate. The sample rate before conversion is displayed in the **Input SR x/x** field. In this example, our internal clock rate is 48kHz. The SRCs are converting these 44.1kHz inputs to 48kHz.

The sample rate conversion algorithm is of a high quality and its presence is normally undetectable without the use of expensive test equipment. Nevertheless, the true audiophile will try to synchronize the input devices to the H8000FW without using sample rate conversion in order to achieve the best possible results.

Note that sample rate conversion is only available on the above inputs – other digital inputs need to be locked if they are used.

Word Clock Termination

Any cable has a *characteristic impedance* that should be matched to both the signal source and destination impedance for best results with high speed sharp edged signals such as Word Clock. This becomes more important with longer cables.

Most Word Clock signals are generated with 50 Ohm source impedance, whereas the BNC cables used to connect to them may have 50 or 75 Ohm impedances – clearly the former are to be preferred.

So, we have covered the source and the cable – what about the destination ? If we only have a single destination it is easy – the destination must also be 50 Ohm – this is ensured by the use of *termination*. An input will be either terminated meaning its impedance is set to 50 Ohm, or un-terminated meaning it has a high impedance that will not load the cable.

With multiple destinations only the one at the end of the cable needs to be terminated – intermediate destinations need not and should not be terminated, as long as the "stub length" of the cable to them is short. These should be connected by the use of a BNC "T" connector or splitter attached directly to their inputs so as to

ensure the shortest possible *stub length*. Using multiple terminations is wrong, both because twice 50 Ohm in parallel gives 25 Ohms (wrong !) and also because it increases loading on the source.

H8000 and H8000A are shipped with termination in place meaning that they can be used at one end of a Word Clock cable without changes. To use them in the middle of a chain the termination should be disconnected by removing the black jumper on the motherboard directly behind the Word Clock connector.

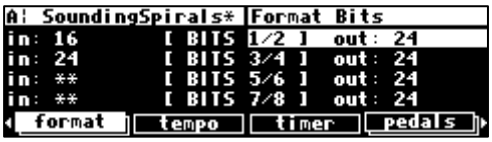
H8000FW has no internal termination and can be used in the middle of a Word Clock cable without change. To use it at the end of a chain, external 50 Ohm termination must be applied. To do this, you will need a BNC T piece as shown above and a 50 Ohm terminator as shown on the right. These may be supplied with the H8000FW or obtained from one of many suppliers. Connect the T piece to the Word Clock input, the cable end to one side and the terminator to the other.

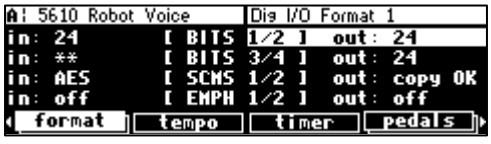
WORD LENGTH (BITS)

Input Word Length

As mentioned in the introduction to this section, the H8000 assumes that the signals at the digital inputs are all 24-bit. Things work out regardless of the actual word length of the input signals because, for example, the 16 bits in a 16 bit signal correspond to the 16 "most significant" bits in a 24 bit signal. The 8 "least significant" bits are left "blank," to be filled in by subsequent processing.

If, however, the device sending the H8000 digital signals supports the protocol, you can see the word length at the inputs to the H8000. Go to the **format** menu page in the SETUP area. The fields on the left display the input word length (16 bits, 24 bits, and two unlocked signals in this case). The H8000 user can display and change these settings on Digital channels 1-8, while H8000A and H8000FW can only show channels 1-4.





If the input bits are unknown as in the case of an S/P DIF input, the field reads, quite logically, "**unknown**." If a digital input is unlocked (not valid or not connected), the field will read "******."

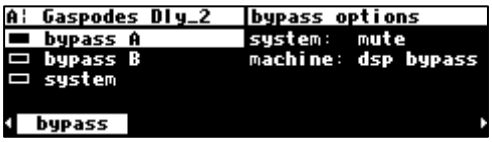
Output Word Length

The indicated output word length can be set on the right-hand side of the **format** menu page in the SETUP area. Your choices for output bits are: **16**, **20**, or **24**.

Unless a special "dithering" preset is in use, this setting will not indicate the actual output word length, but may be useful for external equipment. S/PDIF outputs do not support this word length indication.

Bypassing and Muting

Sometimes you'll find it necessary to bypass the H8000FW using the BYPASS key. A number of bypassing options exist in the LEVELS area. There are two "levels" of bypass, **system** and **machine**. **System** refers to the H8000FW as a whole, whereas **machine** refers to each DSP.



System Bypass

The three options that exist for **system** bypass are:

rly bypass Uses relays to "hardwire" each input to its corresponding output, i.e., analog input 1 is connected to analog output 1, digital input 3 is connected to digital output 3, etc. This may well NOT be the same as the current routed configuration. For example, if Analog in 1 is routed to Digital out 3, this will differ from the connection when bypassed. Be aware of the following:

- When the H8000FW is powered down, it is in **rly bypass** state.
- Because relay bypass directly connects the unit following the H8000FW to that preceding it, the resulting impedance changes can cause a click or change in output level.
- Because the 1/4" analog inputs have no corresponding 1/4" analog outputs, **rly bypass** effectively mutes those analog inputs that are mated with 1/4" plugs.

ADAT, AES11-17 and FIREWIRE are not bypassed in this state.

dsp bypass Makes each output of each DSP the same as its corresponding input. For example, DSP A's output 2 will be the same as DSP A's input 2, DSP B's output 4 will be the same as DSP B's input 4, etc. The routing configuration still applies. *This is the same as setting all the* ***OUTx Wet/Dry*** *parameters on the* ***[dsp A]*** *and* ***[dsp B]*** *menu pages in the* LEVELS *area to* ***0%****, except that the output levels cannot be changed.*

If ADAT, AES11-17 etc are connected to external inputs, they will not be affected.

mute Mutes all the main outputs. If ADAT, AES11-17 etc are connected to external inputs, they will not be affected.

Put the H8000FW into **system** bypass mode either by placing the cursor over the **system** field and pressing SELECT *or* by pressing the BYPASS key. Once the H8000FW is in **system** bypass mode, the Bypass Status LEDs blink, and the **bypass A** and **bypass B** fields are no longer available.

To get the H8000FW out of **system** bypass mode, either place the cursor over the **system** field and press SELECT *or* press the BYPASS key.

→See ***Remote Controlling the Bypass Functions*** on page 112.

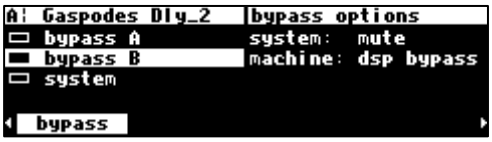
Machine Bypass

The two options that exist for **machine** bypass are:

dsp bypass Makes each output of the bypassed DSP the same as its corresponding input. The routing configuration still applies.
This is the same as setting all the ***OUTx Wet/Dry*** *parameters on the* ***[dsp x]*** *menu page in the* LEVELS *area to* ***0%****, except that the output levels cannot be changed.*

mute Mutes the outputs of the bypassed DSP. The routing configuration still applies.

Put the H8000FW into **machine** bypass mode by SELECTing either the **bypass A** field or the **bypass B** field. The corresponding Bypass Status LED will light when a DSP is bypassed.



To "un"-bypass a DSP, press its **bypass x** field again. Its corresponding Bypass Status LED will grow dark . . .

→See ***Remote Controlling the Bypass Functions*** on page 112.

External controllers are inputs to the H8000FW that allow the modification of parameters from a source outside the H8000FW. These include the foot pedal jacks 1 and 2, the relay jack, and MIDI. In addition to changing parameters such as delay times, pitch shift, LFO rate, etc., in programs, the external controllers can be used to modulate "box" level parameters, such as input levels, Wet/Dry mix, and even screen contrast. (Why you would *want* to modulate screen contrast is not obvious, but it's nice to know you can!)

→ See:

Setting Up the External Controllers on page 94.

External Modulation and Trigger Menu Pages on page 98.

Remote Controlling Parameters on page 113.

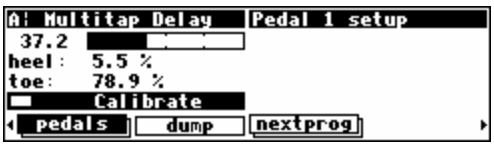
In addition, external controllers can be used to advance through programs.

→ See ***Loading a Program Remotely*** on page 125.

Here we will discuss the "global" setup of these external controllers.

SETTING UP THE EXTERNAL CONTROLLERS

Foot Pedals 1 and 2



Each foot pedal jack accepts a stereo ("tip-ring-sleeve") 1/4" connector (see diagram below). Between the ring and sleeve is a fixed 5 volts provided by the H8000FW. The foot pedal that is hooked up to the jack and returned between the tip and the sleeve alters that voltage. The pedals menu page in the SETUP area allows you to calibrate the foot pedal jacks for the particular foot pedals you are using. The "top" menu page calibrates jack 1, and the "bottom" menu page calibrates jack 2 (just press the pedals SOFT KEY to toggle between the two). The horizontal bar graph at the top of the menu page represents the current foot pedal position relative to the calibration.

To calibrate your pedal, highlight the **Calibrate** parameter with the cursor and press the SELECT key. Rock your foot pedal through its full range of motion, from full minimum ("heel") to full maximum ("toe"), and then press any key. The

heel and **toe** parameters will jump to reflect their new, calibrated values. You're done. Now, when you use that foot pedal to modulate parameters, the minimum foot pedal position will correspond to no modulation and the maximum foot pedal position will correspond to maximum modulation. If you want the opposite to occur (*maximum foot pedal position corresponding with no modulation and minimum foot pedal position corresponding with maximum modulation*), simply calibrate the pedal as discussed above and then *swap* the **heel** and **toe** values.

Pedals to be used with the H8000 should ideally have a resistance of about 10K.

MIDI Setup

In the H8000FW, MIDI can be used:

with programs that explicitly call for MIDI signals. For example, some programs in the H8000FW act like synthesizers that a MIDI keyboard can play.

with programs that explicitly call for some sort of "external" controller. For example, the program "**External Detune**" calls for an external signal to adjust the amount of detune that is applied to an audio signal. You can direct a MIDI controller to do the adjusting.

To remote control *any* parameter in the H8000FW (including input and output levels).

To change programs via MIDI program change messages.

→ See *Loading a Program Via a MIDI Program Change Message* on page 126.

To advance to the next program or select the previous program.

→ See *Triggering the Next or Previous Program to Load* on page 129.

To synchronise the H8000FW's tempo generator to an external source by using MIDIclock.

→ See *System Tempo* on page 134.

To synchronize external equipment to the H8000FW's tempo.

There are several MIDI "global" parameters that bear on how all of the above uses of MIDI function. These parameters are found on the **midi** menu page in the SETUP area (you may have to press the SETUP key a few times to find it). The **midi** menu page is "stacked"; the "top" menu page is shown to the right. Let's look at each parameter in turn, shall we?

MIDI If set to **disabled**, all received MIDI commands are ignored. However, MIDI *output* messages, including parameter changes, program load, bank change, and the various dump commands, are still enabled. Set this parameter to **enabled** if you want to *receive* MIDI messages.

serial Enables or disables the serial port. If set to **enabled**, MIDI commands can be received at or sent from the serial port.

→ See *Setting Up the Serial Port* on page 141.

program load This determines whether the H8000FW will accept and obey MIDI program change messages and allows you to select the number of the Usergroup to be used as a *MIDI map*.

→ See *Loading a Program Via a MIDI Program Change Message* on page 126.

sequence out If set to **old** or **new**, then every time a parameter is changed or a program is loaded, a corresponding message is sent out the MIDI port as a system exclusive message. By recording parameter changes to a MIDI sequencer, you can automate your mix-downs. Simply play back the recorded MIDI sequence at the H8000FW's MIDI input, and you will see the changes you recorded "played" by the sequencer (*assuming **MIDI** is **enabled** and **system exclusive** is **on***). However, if you manage to configure the MIDI connections between your various pieces of equipment such that the "system exclusive, sequence out" MIDI messages of the H8000FW loop back into the H8000FW without delay, digital demons will unleash a raging fury inside your helpless unit. So, make sure that doesn't happen! If you aren't actively using the **sequence out** feature, it's wise to leave it **off**.

→ See *Sequencing With MIDI* on page 145.

If you're recording a fresh **sequence out**, use **new**. Your H8000FW will send messages in a more robust ASCII format than the **old** protocol. Select **old** if the H8000FW will be responding to a sequence recorded in the earlier protocol.

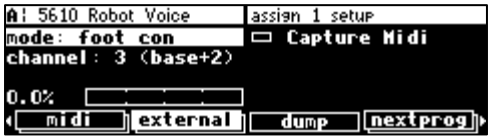
system exclusive If set to **on**, then any system exclusive message that is received by the H8000FW will be accepted and dutifully obeyed. If set to **off**, then all system exclusive messages will be ignored. This switch does not prevent the H8000FW from *sending* system exclusive messages, however. You can use this parameter in conjunction with sequence out by leaving sequence out on and system exclusive off while recording a sequence, and sequence out off and system exclusive on while playing the sequence back. This eliminates the possibility of those digital demons dancing their mean dance in the H8000FW!

device ID All system exclusive messages to and from *this* the H8000FW will have *this* **device ID**. If you're using more than one H8000FW, you can set each one's device ID to a different value. This would let them share a common MIDI chain, while allowing system exclusive messages to be sent to a *specific* H8000FW. Normally, the **device ID** is left at **1**, the factory default. You can control one H8000FW from another by matching their device IDs.

Press the **midi** SOFT KEY again to reveal the "second" menu page.

MIDI This is just the same as the **MIDI** parameter found on the "top" menu page. It's duplicated here for your comfort and convenience.

base channel Selects one of 16 MIDI channels to be the *base channel* from which MIDI channel numbers will be calculated elsewhere in the H8000FW. Changing the *base channel* value will change the MIDI channel numbers of all configured MIDI controllers in the H8000FW by the same amount.



For example, in the screen on the right, *base channel* is set to the default value of 1 and the controller responds to channel 3, being two more than the *base channel*. If *base channel* was changed to 5, the controller would then respond to channel 7.

Base channel has no effect if *omni* is set to *on*.

omni mode If this is ***on***, then a MIDI message on *any* channel is accepted and dutifully obeyed by *every* MIDI message recipient in the H8000FW. This keeps things simple in simple setups. If this is ***off***, then every MIDI recipient in the H8000FW specifies which MIDI channel (offset from the *base channel*) it will accept messages on.

note mode The H8000FW allows selection of **mono** and **poly** mode. **Poly** means one channel has all the notes (keyboards). **Mono** means each channel plays only one note, but you have multiple channels (MIDI guitars, wind controllers).

pressure If this parameter is set to **channel**, then the last changed MIDI aftertouch message on a given channel affects all the notes played on that channel. If it's set to **key**, then a MIDI aftertouch message on a given channel affects only the note with which it is associated.

pitch bend When using a MIDI keyboard to play a synthesizer program in the H8000FW, this parameter controls how many semitones a maximum MIDI pitch bend message shifts the original pitch.

sysex speed The lower the value of this parameter, the slower the H8000FW will transmit MIDI messages. This can be useful if the device being sent to is "unhappy" with faster rates.

midiclk out Will make the H8000FW output a MIDI clock signal that represents its internal tempo (SETUP/**tempo**). This is a high accuracy signal to which other equipment can synchronize.

That's it for MIDI globals. If you press the **midi** SOFT KEY one more time, you'll see parameters pertaining to the serial port's setup.

→ See *Setting Up the Serial Port* on page 141.

External Modulation and Trigger Menu Pages

Many aspects of the H8000FW's operation can be controlled by "external" signals. These "external" signals include MIDI signals and signals at the rear panel foot pedal jacks 1 and 2 (*see External Controllers on page 94* to set these controllers up). External "modulation" involves altering a parameter value over a *range* of values. For example, you could modulate a delay from 5 milliseconds to 25 milliseconds. At different points in time, the delay will be 5 milliseconds, 25 milliseconds, *and all of the values in-between*. An external "trigger," on the other hand, has only two states. It is *not* continuous. For example, you could trigger a gate to open. The gate can be either open or closed. A trigger switches the parameter from one state to the other.

The various external modulation and trigger menu pages you will encounter are all variations on a common theme. Although the length of this section might lead you to think otherwise, all you're really doing on these menu pages is selecting the external controller that will modulate or trigger a parameter. If the external controller you select involves MIDI, then you will also have to deal with MIDI channels and (possibly) MIDI control numbers. This adds length to our discussion, but it shouldn't add complexity.

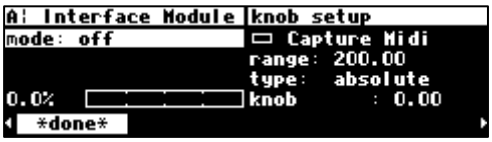
In the case of external modulation menu pages, we're doing one more thing: we're *scaling* the external controller to suit the range of modulation we would like. Again, the concept is simple, but we'll have to get a little wordy in the process of describing it. Apologies . . .

For the sake of providing an example, we're going to externally modulate the **knob** parameter found in the program **Interface Modules**. To load it, set the parameters on the **Criteria** menu page in the SETUP area as shown here.

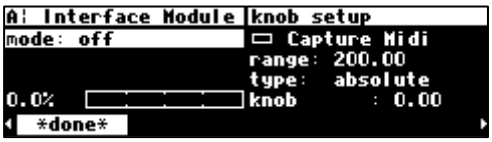
Then use the left and right CURSOR keys to skip through the programs by their first letter to the programs that begin with "i". Then use the up and down CURSOR keys to find the program **Interface Modules** and press the SELECT key.

This program was designed for folks who are interested in creating their own programs (see the separate programming manual). As such, **knob** doesn't do anything useful, but it will serve us well for the purposes of this demonstration.

With the cursor highlighting **knob** on the **inputs** menu page in the LEVELS area, press and hold the SELECT key until the external modulation menu page shown to the right appears. The "SELECT key trick" is how you "remote control" any parameter in the H8000FW and is discussed in depth on page 113. For now, we have a convenient method for getting you to an external modulation menu page. You will also find "explicit" external modulation menu pages in the PARAMETER area (ones that don't require you to press SELECT to see them!) .



→ See *Remote Controlling Parameters* on page 113 if you're really curious.



The first parameter, **mode,** selects the actual external controller that will do the modulating. Our choices are as follows (some are discussed in the section immediately following this one):

off No external modulation at all.

high This isn't really a *modulator* (it doesn't evolve through time). It pins the parameter at its highest modulation value.

mid This pins the parameter at its middle modulation value.

low This pins the parameter at its lowest modulation value.

assign 1, 2, ..., 8, Trig 1&2

These are "placeholders" that are assigned to *actual* external modulators on the **external** menu page in the SETUP area. Until you understand the concept of "redirection" discussed below don't pay any attention to these.

→ You can read about redirection in *The Concept Behind "Redirection" - External Assigns 1-8 and Trigs 1 & 2* on page 108.

pedal 1 & 2 The input from the pedals at the rear panel foot pedal jacks 1 and 2. These jacks are setup on the **pedals** menu page in the SETUP area.

→ See *Foot Pedals 1 and 2* on page 94 to "set them up."

tip 1 & 2, ring 1 & 2, and tip & ring 1 & 2

When a pedal input is used as a switch input, it can operate in one of two modes, supporting either 2 switches or 3 switches. If *any* controller references "tip&ring" for a given socket, that socket will be in "3 switch" mode, otherwise it will be in "2 switch" mode.

In "2 switch" mode:

- "tip" is high when a switch connected between tip and sleeve is closed.
- "ring" is high when a switch connected between ring and sleeve is closed.

To give an added control input, a third switch may be connected so as to connect both tip and ring to sleeve. This will require a 2 pole switch or a few diodes. Alternatively, the same results may be obtained by pressing the first two switches simultaneously to simulate the third switch. (See drawing on page 103.)

In "3 switch" mode:

- "tip" is high when a switch connected between tip and sleeve is closed and the third switch is open.
- "ring" is high when a switch connected between ring and sleeve is closed and the third switch is open.
- "tip&ring" is high when the third switch is closed.

mod wheel MIDI control message 1 - typically assigned to the mod wheel on a MIDI keyboard.

chan pressure MIDI channel pressure message.

pitch wheel MIDI pitch bend message.

breath con MIDI control message 2 - typically assigned to the breath controller on a MIDI keyboard.

foot con MIDI control message 4 - typically assigned to the foot controller on a MIDI keyboard.

Portamento MIDI control message 5 - typically assigned to portamento.

volume MIDI control message 7 - typically assigned to volume changes.

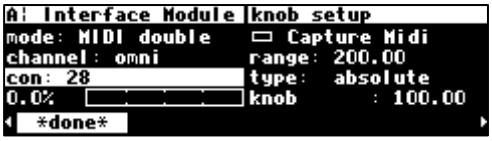
balance MIDI control message 8 - typically assigned to balance.

pan MIDI control message 10 - typically assigned to panning.

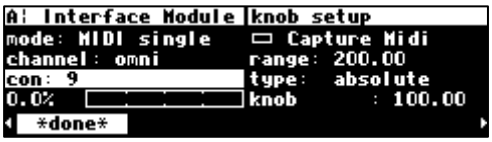
expression MIDI control message 11 - typically assigned to the expression controller on a MIDI keyboard.

general 1, 2, 3, and 4
MIDI control messages 16, 17, 18, and 19.

MIDI double Allows selection of any MIDI control number with very fine quantization. Input range is 0 to 16383. A third parameter appears, **con**, which selects the controller number to be used. Your choices for con are 0 to 31. The MIDI control number con will pass the "coarse" value for the modulation and the MIDI control number con + 32 will pass the "fine" value for the modulation.



MIDI single Allows selection of any MIDI control number with coarse quantization. Input range is 0 to 127. A third parameter appears, **con**, which selects the controller number to be used.



note on MIDI keyboard note number. Middle C on an 88 note keyboard gives a value of "60."

note switch Turns on when the specified midi note is received.

MIDI program Triggers when a MIDI program change message is received.

MIDI Clock Modulates as a function of the BPM (beats per minute) of a MIDI clock signal. The value of this external controller is:
(input BPM) / 480 = value

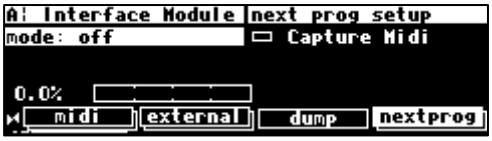
so 120BPM yields a value of *0.25*, 96BPM yields a value of *0.2*, and so on. This MIDI message is channel-independent.

MIDI start Triggers when a MIDI start command is received. This MIDI command is channel-independent.

MIDI stop Triggers when a MIDI stop command is received. This MIDI command is channel-independent.

"Manually" Selecting the External Controller for Triggers

External trigger menu pages are less common than external modulation menu pages. A good example of one is the **nextprog** menu page in the SETUP area (you may have to press the SETUP key several times to find it). As on external modulation menu pages, **mode** selects the external controller that will do the triggering. Our options are:



off No triggering at all.

trig 1 & 2 These are "placeholders" that are assigned to *actual* external controllers on the **external** menu page in the SETUP area. Until you understand the concept of "redirection" discussed below, don't pay any attention to these.
→ You can read about redirection in *The Concept Behind "Redirection" - External Assigns 1-8 and Trigs 1 & 2* on page 108.

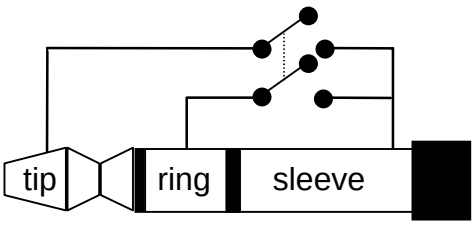
tip 1 & 2, ring 1 & 2, and tip & ring 1 & 2

When a pedal input is used as a switch input, it can operate in one of two modes, supporting either 2 switches or 3 switches. If *any* controller references "tip&ring" for a given socket, that socket will be in "3 switch" mode, otherwise it will be in "2 switch" mode.

In "2 switch" mode:

"tip" is high when a switch connected between tip and sleeve is closed.

"ring" is high when a switch connected between ring and sleeve is closed.



To give an added control input, a third switch may be connected so as to connect both tip and ring to sleeve. This will require a 2 pole switch. (Refer to Drawing). The drawing represents the connections that need to be made with the *wires* that are connected to the tip, ring, and sleeve. Alternatively, the same results may be obtained by pressing the 2 switches simultaneously to simulate the third switch.
In "3 switch" mode:

- "tip" is high when a switch connected between tip and sleeve is closed and the third switch is open. If you're using two switches, "tip" is high when the switch between tip and sleeve is closed but the switch between ring and sleeve is open.
- "ring" is high when a switch connected between ring and sleeve is closed and the third switch is open. If you're using two switches, "ring" is high when the switch between ring and sleeve is closed but the switch between tip and sleeve is open.
- "tip&ring" is high when the third switch is closed. If you're using two switches, "tip&ring" is high when the switch between tip and sleeve is closed *and* the switch between ring and sleeve is closed.

damper Triggers when a damper control message (MIDI control message 64) is received with damper = 1.

portamento Triggers when a portamento control message (MIDI control message 65) is received with portamento = 1.

sostenuto Triggers when a sostenuto control message (MIDI control message 66) is received with sostenuto = 1.

soft Triggers when a soft control message (MIDI control message 67) is received with soft = 1.

hold 2 Triggers when a "hold 2" control message (MIDI control message 69) is received with "hold 2" = 1.

general 5, 6, 7, and 8

Triggers when a general 5-8 MIDI control message is received with value = 1.

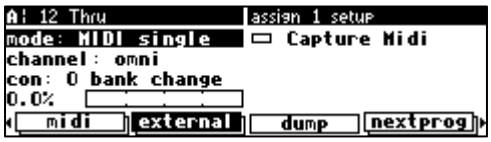
note on Triggers when a MIDI note message is received.

MIDI program Triggers when a MIDI program change message is received.

mod 1, 2, 3, and 4

Triggers when the *mod 1*, *2*, *3*, or *4* parameter passes 50%.

MIDI single Allows selection of any single byte MIDI control number. When a control value of 50% of full range is received, a trigger will occur. The trigger is reset when a value of less than 50% is received. A third parameter appears, **con**, which selects the controller number to be used.



MIDI double Allows selection of any double byte MIDI control number. When a control value of 50% of full range is received, a trigger will occur. The trigger is reset when a value of less than 50% is received. A third parameter appears, **con**, which selects the controller number to be used.

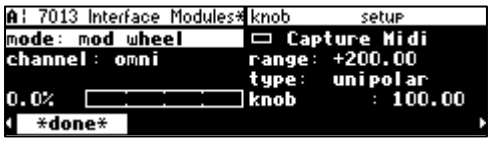
MIDI start Triggers when a MIDI start command is received. This MIDI command is channel-independent.

MIDI stop Triggers when a MIDI stop command is received. This MIDI command is channel-independent.

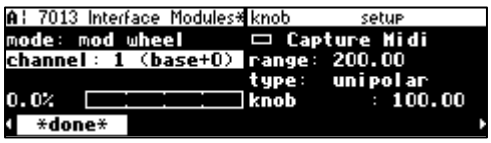
External Controller Selection

Parameters Common to Both External Modulation and External Trigger Menu Pages.

For all of the above MIDI messages, except for those involving "MIDI clock," if **omni** is set to **on** on the **midi** menu page in the SETUP area, then the MIDI message will be accepted on any channel. Although you can highlight the **channel** parameter here, you cannot change it from **omni**. You must go to the **midi** menu page in the SETUP area to change it.



If **omni** is set to **off** on the **midi** menu page in the SETUP area, then the second parameter on the screen, **channel**, selects which MIDI channel the MIDI message will be accepted on (relative to the **base channel** found on the **midi** menu page in the SETUP area). If the value of **base + x** is greater than 16, the result "wraps" around. For example, if **base channel** were set to **10**, and **channel** were set to **base + 12**, the *actual* MIDI channel used would be



10 + 12 = 22

22 - 16 = **6** SIX!

MIDI Running Status

It's worth noting that MIDI commands are often sent on a MIDI connection only if the command being sent differs from the last command sent. Between the occasional command messages are data messages. A data message pertains to the last sent command message. These are known as "Running Status."

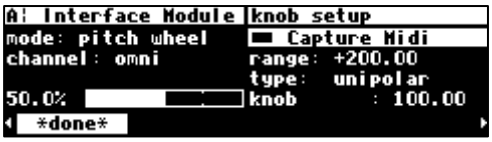
You could send a MIDI command message to the H8000FW with the MIDI parameter on the [midi] menu page in the SETUP area set to disabled. If you then change the MIDI parameter to enabled, you must re-send the MIDI command message before the MIDI data messages will be accepted. Try sending a different MIDI command to get things started, or try cycling power on your MIDI source.

Automatically" Selecting a MIDI External Controller

As opposed to "manually" selecting a MIDI controller, along with its proper channel and control number, a feature exists that "captures" the first MIDI message sent to the H8000FW and uses it as the external controller. This works on both external modulation and external trigger menu pages.

On the upper right-hand side of the screen, you will find a function called **Capture Midi**. Highlighting this parameter and pressing the SELECT key puts the H8000FW in "Capture" mode. The **mode** parameter reads "**CAPTURE.**"

The next type of MIDI message received by the H8000FW will be used for the **mode** parameter, and the MIDI channel that it is received on will be used for the **channel** parameter. Of course, if you are in **omni** mode, the **channel** parameter will remain **omni** regardless of what channel the message is received on. *To exit "Capture" mode without "capturing," just press the SELECT key again.*



For example, if on the screen above (set to "Capture" mode) we send a pitch bend message, the screen to the right results. The **mode** is set to **pitch wheel**.

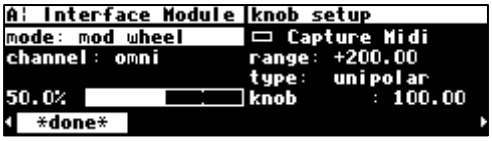
At this point, we have discussed all of the parameters that are relevant to *selecting* an external controller for modulation and triggering. If the external controller you would like

to use *doesn't* involve MIDI, simply select it with the **mode** parameter. If the external controller you would like to use *does* involve MIDI, you have a choice. You can explicitly enter it with the **mode** parameter, selecting the proper **channel** and, if you've chosen **MIDI double** or **MIDI single**, selecting the **con** number. Alternatively, you can use the **Capture Midi** feature, sending the MIDI signal you would like to modulate or trigger with from your MIDI source and letting the H8000FW figure out the **mode**, **channel**, and **con**.

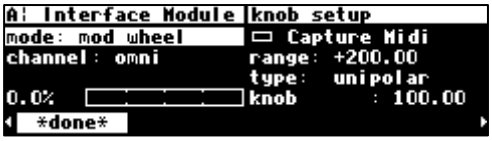
***Note**: To aid in troubleshooting, you can use the BUSY LED as a "MIDI chaser." With the Memory Card removed, any MIDI signals sent to the H8000FW at the MIDI In port cause the BUSY LED to flash. If you're trying to send MIDI messages to the H8000FW, but the BUSY LED isn't flashing when you do (and the Memory Card is removed), you know something is wrong with the connections outside the H8000FW!*

Scaling the External Controller

The remaining parameters on the external *modulation* menu page pertain to *scaling* the selected external controller to suit the range of modulation desired.



The horizontal bar graph on the bottom of the left-hand side of the screen displays the current value of the controller you selected in **mode** on a scale of approximately 1 to 100. Use this bar graph to visually confirm that the external controller you have selected is actually "finding its way" to this menu page. If you manipulate your external controller and this bar graph doesn't change, something is wrong! To see how this works, if you select "**mode: pitch wheel,**" jiggle the pitch wheel on your keyboard and then leave it alone, you will see the screen shown above. The bar graph reads **50.00**, halfway between full minimum and full maximum.

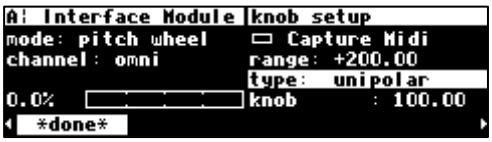


If you pull the pitch wheel all the way down, you'll get the screen to the right. The bar graph reads **0.00**, full minimum. Similarly, if you crank the pitch wheel all the way up, the bar graph reads full maximum.

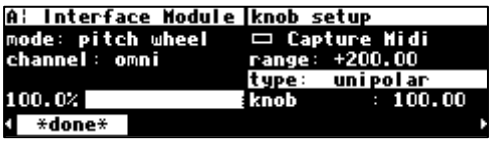
The next parameter we come to is **range**. After all this discussion you may have forgotten that what you're actually doing is *modulating a parameter*, but that *is* what you're doing. And parameters come in all shapes and sizes (like people). For example, you must be able to modulate a delay time from 5 milliseconds to 25 milliseconds with a full rock of the foot pedal just as you must be able to modulate a pitch shift from 0 cents to minus 4800 cents with a full rock of the foot pedal. The **range** parameter allows us to do just that.

With **range** set to **+200**, the external controller's range corresponds to the full range of the parameter's values *(different types of parameters will have different "full ranges")*, which in this case is from -100 to +100. However, with various settings of **range**, the parameter being modulated (**knob** in this case), and the external controller doing the modulation, it is possible to "pin" the parameter being modulated at its minimum or maximum values. That's what's going on in the example to the right.

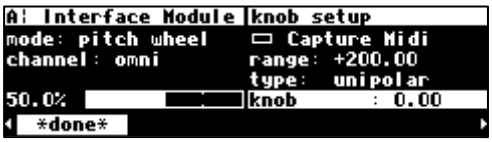
With the pitch wheel all the way down, the value of **knob** is 100.



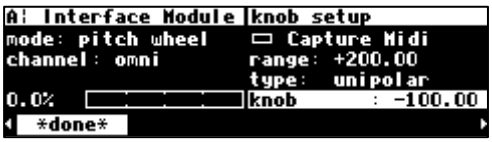
With the pitch wheel all the way up, the value of **knob** is 100! That's no good.



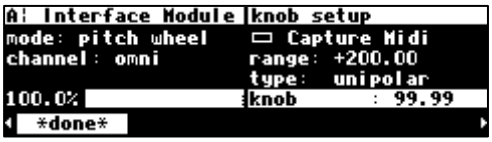
Adjust the value of the parameter being modulated to remedy this situation *(see further examples below)*. In this case you're going to manually change the value of **knob** to **0** while the pitch wheel is idle (at **50%**).



Because you did this and because **range** is set to **+200**, the parameter now "behaves."



See how it behaves? Oh, behave! Behave!



***Note:** It is also possible to set **range** to a negative value. Doing so allows the value of the parameter being modulated to decrease while the external controller is increasing.*

The **range** describes how the parameter will respond to the external controller. Smaller values result in small changes; larger values result in larger changes. When **type** is set to **absolute** and the external controller is all the way down, the parameter will take on its minimum value, **0 %** in this case.

When **type** is set to **absolute** and the external controller is all the way up, the parameter will take on a value determined by **range**, **66 %** in this case.

When **type** is set to **unipolar** and the external controller is all the way down, the parameter will take any value you select. Here you selected **10%**. Let's call this the *origin*.

When **type** is set to **unipolar** and the external controller is all the way up, the parameter will take on a value determined by the *origin* and the **range**. Here 10% plus 66% = **76 %**.

When **type** is set to **bipolar**, the parameter takes on the value of the *origin* when the external controller is halfway up (or halfway down if you're a pessimist).

The final parameter on the external modulation menu page is just a duplicate of the parameter you're modulating. Its value reflects the applied external modulation, so you can see the result of all your futzing as you futz *(the external modulation's value will be ADDED to the parameter's value)*. Additionally, you can adjust the value of the parameter while you futz as we did in the example above. *If you modulate a gang of four or more parameters, they will* not *be shown on the external modulation menu page because there isn't enough room to fit them all!*

In practice, scaling is even more flexible than we've described here. It's one of those things that's much easier to do than to describe!

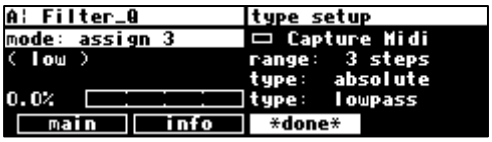
The Concept Behind "Redirection" - External Assigns 1-8 and Trigs 1 & 2

"Redirection" allows a program developer to use an external controller in his program, while allowing one to assign which actual external controller is used at a later time. An external controller "placeholder" is used in the program, and you fill in a specific external controller for that "placeholder." Redirection also allows you to select a "placeholder" on an external modulation or trigger menu page. If you select the same "placeholder" on several external modulation or trigger menu pages, you can change the actual external controller that fills that "placeholder" by making one change. If redirection didn't exist, you would need to go to each and every one of those external modulation or trigger menu pages and change the actual external controller manually. *Wow ! That's pretty abstract. If it doesn't make sense yet, read through this section and then* re-read *this paragraph.*

There are eight external *assignment* "placeholders": *assign 1, assign 2, ..., assign 8*.

There are two external *trigger* "placeholders": *trig 1* and *trig 2*.

These "placeholders" are selected as the **mode** on external modulation or trigger menu pages littered throughout the H8000FW. For example, *assign 3* can be assigned here. . .

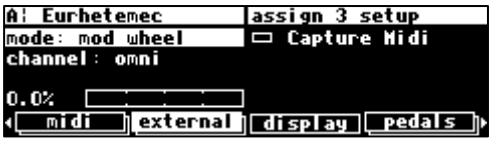


And here. . .

And here. . .

And anywhere. . . You see that a single "placeholder" can modulate or trigger many different parameters.

A single "placeholder" is "filled" by an *actual* external controller at *one* place: the **external** menu page in the SETUP area. A single "placeholder" is "filled" by *only* one *actual* external controller. In the example screen shown to the right, the *actual* external controller **mod wheel** has been selected to "fill" the "placeholder" *assign 3*.



Now all of the "and here. . ." example screens shown above would *actually* be modulated by the mod wheel!

Moreover, the value in parentheses above, **(low)**, would change to **(mod wheel)**.

The **external** menu page is "stacked." Press the **external** SOFT KEY repeatedly to cycle through menu pages for *assign 1*, *assign 2*, *assign 3*, ..., *assign 8*, *trig 1*, and *trig 2*. These menu pages behave just like those that were discussed in *External Modulation and Trigger Menu Pages* on page 98, except that there is no **range** parameter. This makes sense because a single "placeholder" can be selected to externally control a multitude of parameters. "Scaling" is done on the external modulation or trigger menu pages littered throughout the H8000FW that have as their **mode** the "placeholder."

So, "redirection" allows you to configure your external modulation and trigger menu pages to suit the particulars of your studio/rack setup. Let's say you frequently use a foot pedal, the pitch wheel, the mod wheel, and MIDI controller 10 (pan) to do external modulations and MIDI Note On and MIDI Start to do external triggers. Instead of explicitly assigning all of these external controllers on external modulation and trigger menu pages in the programs that you save, you could instead assign *assign 1, assign 2, assign 3, ..., assign 8, trig 1,* and *trig 2*. Then go to the **external** menu page in the SETUP area and assign the foot pedal to *assign 1*, the pitch wheel to *assign 2*, the mod wheel to *assign 3*, MIDI controller 10 to *assign 4*, MIDI note on to *trig 1*, and MIDI start to *trig 2*.

Here are the benefits: If you take the H8000FW on the road or to another studio and need to use different external controllers, you don't have to re-edit all of the programs you use. Instead, just reassign the "placeholders." If you get a new sequencer that has different "convenient" controllers than the ones you've been using, you don't have to re-edit all of the programs you use. Instead. . . All right. You get the idea.

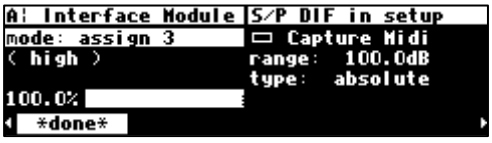
We should run through an example to make sure you're clear about what's going on here. While you're going to use placeholders to modulate system-level parameters, you would normally use them to modulate parameters in programs such as feedback, chorus level, pitch shift, etc.

Let's highlight the first digital input on the **inputs** menu page in the LEVELS area (in this case the first digital input is **S/P DIF in 1**). Remember to press the DOWN CURSOR key to "un-gang" parameters.

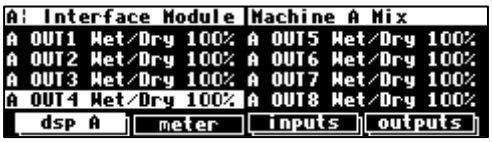
→ See *Ganged Parameters* on page 20 for more about "gangs."

Press and hold the SELECT key for one second. The menu page to the right appears.

→ To change the "one second hold time," see *Miscellaneous Setup Options* on page 140.

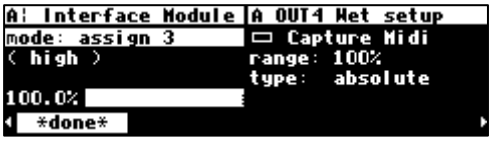


Set the **mode** to **assign 3**. Press the ***done*** SOFT KEY to save the assignment and return to the **inputs** menu page in the LEVELS area.



Next, let's highlight **A OUT4 Wet/Dry** on the **dsp A** menu page in the LEVELS area. Remember to press the DOWN CURSOR key to "un-gang" parameters.

Press and hold the SELECT key for one second. Set the **mode** to **assign 3**. Press the ***done*** SOFT KEY to exit.



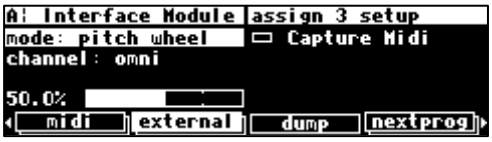
→ To change the "one second hold time," see

Miscellaneous Setup Options on page 140.

At this point, we've assigned the "placeholder" *mod 3* to modulate both **S/P DIF in 1** and **A OUT4 Wet/Dry**. Now, let's "fill in" this "placeholder" with an actual external controller.

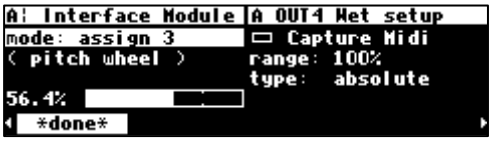
Go to the **external** menu page in the SETUP area. Press the **external** SOFT KEY repeatedly until you see "**assign 3 setup**" in the upper right-hand corner.

You can set **mode** to anything you like; we're going to set it to **pitch wheel** on **channel omni** (*the **omni** parameter on the **[midi]** menu page in the SETUP area needs to be set to **off** in order to assign a* specific *channel*).



Now, when you move the pitch wheel both **S/P DIF in 1** and **A OUT4 Wet/Dry** are modulated!

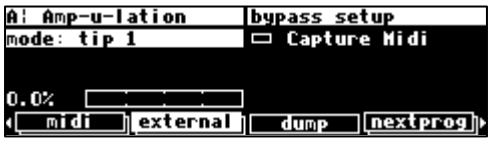
*(Select the MIDI **base channel** on the [midi] menu page in the SETUP area.)*



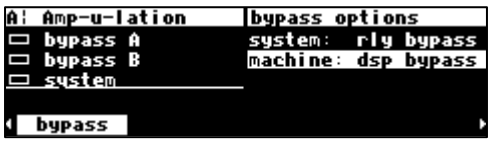
If you actually followed along with your H8000FW, you'd be wise to go back to these two parameters and set **mode** to **off,** so that your input levels and wet/dry ratios don't start doing freaky things in response to the pitch wheel in the future!

The very first time you switch on the H8000FW, you will find that assigns 1-8 are set to **high** - this is so that any programs which use one of these as a volume control input are not silenced. It is recommended, for the same reason, that, if you change these settings and then want to remove the change, you set them back to **high**, rather than to **off**.

Remote Controlling the Bypass Functions



It is often necessary to be able to remote control the system bypass function. For this reason a special controller has been set up for this purpose. It can be found under **SETUP/external**. Press this key a few times until you come to it.



Another way to remote control system bypass, which also applies to machine A and machine B bypass, is to use the SELECT and hold approach on the **LEVELS/bypass** page, treating it as if it were any other parameter.

→ See *Remote Controlling Parameters* on page 113.

REMOTE CONTROLLING PARAMETERS

Parameters can be remote controlled via MIDI or the rear panel foot pedal jacks. To remote control a parameter, first highlight it with the cursor. Here we've highlighted the parameter **mix**.

With the cursor in place, press and hold the SELECT key until the screen changes to the "remote control" menu page. After pressing and holding the SELECT key on the parameter **mix** above, we arrive at the external modulation menu page shown to the right.

This is the same menu page we discussed *interminably* in *External Modulation and Trigger Menu Pages* on page 98. We won't rehash it here.

→To change the "hold time," see *Miscellaneous Setup Options* on page 140.

After making an assignment, you can exit this screen by pressing the ***done*** SOFT KEY. You may notice that the H8000FW flashes "**Control will be lost if preset is not saved**" if the parameter you are remote controlling belongs to a program (as opposed to a "global" parameter such as an input level). This means that you must **‹save›** or **‹update›** the program to ensure that your remote control will still be there the *next* time you load the program. Of course, if you don't care if the remote control is there the next time you load the program, then don't worry about it!

→See *Saving a Program* on page 129.

Assuming that the **mode** on the above menu page was set to something other than **off** when you exited, **mix** will be underlined. This indicates that it is remote controlled.

The underline blinks to add an element of fun and excitement to the H8000FW's display and to cheer you up when you're feeling glum. You can return to the remote control menu page by highlighting **delay** and holding the SELECT key again. If you change the **mode** to **off** on the "remote control" menu page, **delay** will no longer be underlined and nothing will blink. How sad.

Remote Controlling Triggers

As we mentioned before, some soft keys are known as *triggers* because pressing them causes an action to happen, as opposed to displaying a menu page. An example of this is shown in the program **Simple Sampler**. **‹record›**, **‹play›**, and **stop** are all triggers.

To remote one of the triggers, press and hold the soft key for about a second. This will then bring up the remote control screen described above, allowing you to choose how you want to control it. The flashing underbar indicates that this key is remotely controlled. If you change the **mode** to **off** on the "remote control" menu page, the underline will, of course, go away.

→ To change the "one second hold time," see *Miscellaneous Setup Options* on page 140.

MIDI Groups

The use of "MIDI groups" allows an alternative way to control the H8000FW from MIDI, with the minimum of setting up. A MIDI group is a numbered sequence of MIDI controllers, for example, 70,71,72 .. 77. When the H8000FW has been told to respond to this group, these controllers will correspond to the parameters on the H8000FW's screen. This allows a multi-controller such as the Peavey PC1600 to control the H8000FW with very little configuration required.

For example, referring to the parameter screen at the right, the MIDI group from 70-77 would give you the following results:

70: **predelay**

71: **decay time**

72: **room size**

73: **diffusion**

74: **hi decay**

75: **hi freq**

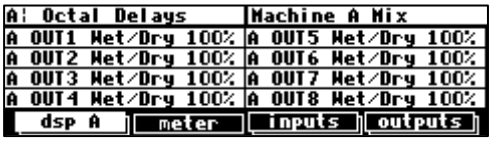
76: **lo decay**

77: **lo freq**

Each parameter would be controlled over its full range - for example, in this preset **lo freq** has a minimum value of 10 (Hz) and a maximum value of 1000 (Hz). This means that the minimum MIDI value (0) would give you 10 (Hz) and the maximum MIDI value (127) would give you 1000 (Hz).

In this example, using a MIDI *single* controller, the resolution will be limited to the 128 steps offered by MIDI, meaning that the minimum change possible is (1000-10)/128 or about 8Hz. MIDI *double* controllers (numbered 0 to 31) will give better resolution.

If you then changed to a different screen, say **DSP A** in the LEVELS area, the following would apply:



70: A OUT1 Wet/Dry

71: A OUT2 Wet/Dry

72: A OUT3 Wet/Dry

73: A OUT4 Wet/Dry

74: A OUT5 Wet/Dry

75: A OUT6 Wet/Dry

76: A OUT7 Wet/Dry

77: A OUT8 Wet/Dry

The MIDI group will continue to control whichever screen is displayed. This looks useful: how do we set up such a MIDI group ? All will become clear ….

Configuring the MIDI Group

The last key in the SETUP/MIDI "stack" controls the MIDI group. This operates just like any of the H8000FW's other controller screens, with some added features:

- The parameters on this screen cannot be controlled by way of the MIDI group. There's a reason for this. The controller number **con** is the first controller number in the group. This is most usefully set up by MIDI capture.

→ See page 98 for more on MIDI capture.

- The **group size** is the number of controllers in the group. For example, in the screen at the right, the group is from 70 to 77. This is a useful location for the group, as these controllers are unassigned by the MIDI specification and not generally used.

- The **active con** displays the number from 1 to **group size** of any member in the group that changes. This is useful as a way of checking that the group is set up correctly and is acting on received MIDI signals. It will display **0** as shown above if no group member has changed since power-up.

- If **operation** is **normal**, the external controller will directly control the parameters on the current screen. This sounds right, but can cause problems when moving from screen to screen. For example, suppose you are using a fader-based controller like the Peavey 1600, and you push the fader all the way up to control, say, a vibrato depth. Then you switch to another screen where the same fader controls the master output level. The minute you touch the fader, the level will go way up, and the floor will be covered with bits of loudspeaker. This can be prevented by setting **operation** to **sticky**.

- If **operation** is **sticky**, each member in the group can only be changed by moving the controller through its current position. The value will then *stick* and respond to further movements of the controller. Looking at the top right of the screen, you will see a small horizontal thermometer. The arrow shows the direction to move the controller to pass through the current value, while the vertical bar is the position of the current value. Once the current value has been reached the thermometer will disappear and you will have full control.

Program Load, Save, Delete, Etc.

"...the H8000FW is like a jungle gym for sine waves..."
-Anonymous

Programs are the "algorithms" used by the DSPs to process signals. Programs are stored in the H8000FW in the same way that files are stored on your computer's hard drive. Instead of using a hard drive, however, the H8000FW uses RAM memory, either internally or on a card. The load times are much faster and the unit is more durable and quieter than it would be were a hard drive to be used.

When you want to use one of the H8000FW's programs, you "load" it. When using both DSPs, there are two programs that are "loaded" (or "running") on the H8000FW: one on DSP A and the other on DSP B. (Of course, if you want to, you can run the same program on both DSPs. There will be two "instances" of that program running, and the parameter values set for one will not affect those of the other.) All of the "non-monolithic" programs in memory are available to either DSP (except for "large sampler programs" and some "long delay" programs - these can only be loaded on DSP A).

"Monolithic" programs use the resources of both DSPs. As such, only one monolithic program can run at a time, and it uses the routing configuration of DSP A.

You can save a program that is running in two ways:

The first is to use **Save** - you won't overwrite the old version of the program.

The second way to save a program is to **‹update›** it - this performs a "one-click" write to User (internal) Memory.

Of course, you can delete a program from memory if you wish (you will quickly find out that you cannot delete the presets that came with the H8000FW).

Categorizing Programs

The H8000FW comes with over one thousand factory programs, on top of any that you may save to User Memory or Memory Card. Many hundreds - and each one is unique! To help make finding a useful program for a given situation easy, each program is categorized in several different ways. These categories form a powerful "database" which is one of the key features of the H8000FW. We discuss the different ways to quickly locate the right effect for your application below and recommend that you make an effort to understand this section fully - the time taken will be well spent.

Categorized by Effects Type

Although each program is unique, all programs can be categorized broadly by the types of effects that they contain. This is useful in that it allows you to compare programs with similar capabilities:

- *Samplers (**S**)*
- *Pitch shifters (**P**)*
- *Reverbs (**R**)*
- *Delays (**D**)*
- *Modulations (**M**)*
- *Complex (**C**)*
- *Equalizers and Filters (**E**)*
- *dYnamics (**Y**)*

Programs can and usually do contain more than just one of these effects types. The letters to the right of the names above are the shorthand notation as shown on the **list** menu page in the PROGRAM area. Here, **Kick/SnareReplacer** is a complex (**C**) preset that uses samplers (**S**), delays (**D**), equalizers (**E**), and dYnamics (**Y**). **Kill The Guy** only uses modulations (**M**) and equalizers/filters (**E**).

When you save your own programs or your own tweaks of factory programs, you can assign effects "flags" yourself on the **effects** menu page in the PROGRAM area. Here the **Pitch** and **Delay** flags are on - a "**P**" and "**D**" will appear next to this program's name on the **list** menu page.

Categorized by Intended Source

Many (but not all) of the H8000FW's programs have been categorized by what source material they were designed for. This is *in addition* to their effects type! The list of sources is:

- *Guitar*
- *Vocals*
- *Drums*
- *Keyboard*
- *Special Effects*
- *Surround*

Unlike categorization by effects type, there is no way to see categorization by intended source on the **list** menu page in the PROGRAM area. However, as we will see shortly, categorization by source becomes very handy once you start searching for programs.

When you save your own programs or your own tweaks of factory programs, you can assign source "flags" yourself on the **sources** menu page in the PROGRAM area. Here the **Vocals** and **Special FX** flags are on.

Categorized by Similar Programs (Banks)

All of the H8000FW's programs are categorized by placing them in groups of similar programs, which we'll call "banks." You may have noticed that most programs have a four-digit number associated with them. The first two numbers define the bank that a program belongs to. Here **One Time Rhyno** belongs to bank **66**. **One Way Phaser** belongs to bank **36**. **Onirica Ritmica** belongs to bank **13**.

If you move the cursor on this menu page, the upper right-hand corner will briefly display the bank name for the highlighted program. Here **One Time Rhyno** belongs to bank **66 – Virtual Racks**. The banks provide a loose grouping for related programs, with a name indicating their nature of function.

Here **One Way Phaser** belongs to bank **36 – Phasers**. You will note in passing that if all of the programs were placed in numerical order, they would effectively be sorted by banks! This fact will prove handy once you start searching for programs.

You can see a list of the H8000FW's banks by loading the "program" **H8000 Banks**. In the PARAMETER area is a list of all the H8000FW's banks with their associated numbers for you to scroll through.

Categorized by You (User Groups)

This is extremely handy! You can use the **usergrp** menu page in the PROGRAM area to assign programs to any of ten "user groups" in User Memory and another ten on the Memory Card. Maybe you want to "group" all the programs associated with a certain project for ease of access later on. Maybe you want to keep track of programs you really like.

First use the KNOB on the top line to select the group you want to change.

Then, to find a place to put it, use the KNOB on the third line (**Prog Chng**). If you want to use this Usergroup as a MIDI Map, this number is the MIDI Program change number, otherwise, think of it as a "slot number". To find an unused "slot", keep going until the **Preset** in the second line shows **‹none›** or **‹empty›.**

→ See *Loading a Program Via a MIDI Program Change Message* on page 126.

Now, go to the second line and use the wheel or the keypad to find the program that you want to add to the Usergroup. Here we've included the program **4_ReverseTetra** in **Group7**.

This line shows the programs according to the Search and Sort options on the **Criteria** page. The wheel or keypad can be used to move through them in the same way as on the **list** screen.

A tip - it's easier to find things by name using the knob if you have previously set ***Sort By*** *to* ***Name*** *on the* ***Criteria*** *page.*

Note that Usergroup 1 is a Factory group, with a selection of the more interesting programs in the H8000FW. This group cannot be changed. The names of presets included in it can be found in the H8000FW Presets Manual.

Categorized by Recent Use

We will go into more detail in the next section, but the H8000FW keeps track of what programs you've recently loaded.

You can find this list (and reload those programs from it) by setting **Search By** to **User Grp** on the **Criteria** menu page in the PROGRAM area. Then go to **list** and use the **‹ - -** and **- - ›** SOFT KEYS to find the **Most recent** list - this is the first list in this section - think of it as Usergroup 0. If you mostly work with the same programs, this saves you having to find them every time.

Before reading this section, please be sure to have read and fully understood the preceding section, "Categorizing Programs" on page 117. This section and its predecessor are worthy of study, as they make finding the right program for your work much quicker and easier. You would probably like that ..

The **Criteria** menu page in the PROGRAM area lets you search for programs based on their effects type, intended source, bank, and several other criteria. Let's dissect each of these parameters in turn. Note that the programs displayable (and thus loadable) at any time are the result of the combination of the setting of these controls. Also, any program, whether visible under the current settings or not, may be displayed by entering its number on the keyboard.

Sort By determines how the results of a search are displayed on the **list** menu page. **Number** sorts programs by their four-digit number. As was discussed in the previous section, this effectively groups similar programs into "banks." All four of these programs begin with the two digits **30**, which is the "Multi-effects" bank! Use the left and right CURSOR keys to jump from bank to bank (e.g., from program **30xx** to program **31xx** to program **32xx** and so on).

You can also type a number in with the KEYPAD - you will jump to the program whose number comes closest to the one you typed. **Tip** - when you use the keypad, if you enter the exact number, you can select programs that are not otherwise visible.

Sort By Name sorts programs alphabetically. This is a handy way to find a program if you know its name. Use the left and right CURSOR keys to skip through programs alphabetically (e.g., from programs that begin with **D** to programs that begin with **E** to programs that begin with **F** and so on).

Sort By Effects sorts programs based on their fundamental effects types. As shown here, all of these programs use pitch shifters (**P**), delays (**D**), and modulators (**M**). If you were to use the KNOB to scroll up or down, you would find other groupings. Use the left and right

CURSOR keys to skip from grouping to grouping (e.g. from programs that use **PDM** to programs that use **RDM** to programs that use **PRDM** and so on).

The second parameter, **Search By**, causes the ‹ - - and - - › trigger SOFT KEYS to perform searches using different criteria. The default value, **All**, doesn't perform any search at all. Every program in the H8000FW is listed on the **list** menu page in the order defined by **Sort By**.

Search By Source causes the ‹ - - and - - › trigger SOFT KEYS to cycle through programs that were created for specific source material (guitar, vocals, drums, etc.). In this example, the upper right-hand corner of the screen indicates that a "search" turned up **63** programs that were designed for use with **Vocals**.

Search By Effect causes the ‹ - - and - - › trigger SOFT KEYS to cycle through programs that contain each of the different effects types (samplers, reverbs, delays, etc.). In this example, all **708** programs that the "search" turned up use a **Delay** (**D**) algorithm. Pressing the - - › trigger SOFT KEY would display programs that use a **Modulation** (**M**) algorithm.

Search By Src+FX causes the ‹ - - trigger SOFT KEY to cycle through programs based on their intended source. Given an intended source (e.g., guitar), the - - › trigger SOFT KEY cycles through effects types. Here you see **40** programs that were designed for vocals (**Vcl**) (selected by the ‹ - - SOFT KEY) that contain delay (**Dly**) algorithms (selected by the - - › SOFT KEY).

Search By User Grp causes only programs that have been assigned to a selected "user group" to be shown. The ‹ - - and - - › SOFT KEYS flip between user groups 1 through 10 *and* the most recently used program list. Here we see the four programs that have been assigned to **Group7**.

The H8000FW has internal memory for **Factory** programs (those that came with the unit) and **User** programs (those that you have tweaked and saved or created afresh). It can also save programs on Memory **Card**s. Use the third parameter, **Location**, to filter which programs are shown on the **list** menu page based on where they are saved (the default value, **All**, shows all programs are shown regardless of where they are saved).

The fourth and fifth parameters, **Inputs** and **Outputs**, filter which programs are shown on the **list** menu page based on how many inputs or outputs they use. Your choices are **any** (any number of i/o's), **stereo** (2 or 3 i/o's), **quad&2+2** (4 or 5 i/o's), **5.1** (6 or 7 i/o's), and **octal** (8 i/o's). This allows you to only display programs suitable for your application, i.e. if you are working in **5.1** you may not want to be bothered with **stereo** effects, and *vice-versa*.

Show determines if only those programs that are **loadable** will be shown on the **list** menu page or if **any** program will be shown. If you are using higher sampling rates (e.g., 96kHz), some programs are unloadable. Assuming you're using a higher sampling rate, with **Show** set to **any**, these programs have lines through them. To avoid this unpleasantness, leave **Show** set to **loadable**. In the same way, some programs may only be loaded on DSP A, and may not be loaded if DSP B is selected.

Similarly, some programs come in two versions: a monolithic version for 88/96k operation, and a single machine version for 44/48k operation. Normally only the relevant one of these is visible, but if **Show** is set to **any**, both of these can be seen, as shown by 'Static' Flanger in the screen above.

Finally, **Machines** determines if only programs that run on a *single* DSP will be shown (**A & B**), only those that are "monolithic" will be shown (**II A only**), or if both sorts of programs will be shown (**any**) on the **list** menu page.

A & B is useful if you know that you want a dual machine configuration and don't wish to be bothered by monolithic programs. Similarly, if you want to only see the most powerful programs, set it to **II A only.**

Loading Programs

Programs are loaded by first selecting a program to load in the PROGRAM area. You select a program to load by sorting through the available programs (see the preceding section). Use the up and down CURSOR keys or the KNOB to highlight the program you want to load on the **list** menu page.

It's important to note that the program will be loaded into the currently displayed DSP as indicated by the upper left-hand corner of the display.

If you want to load a "non-monolithic" program into the DSP not currently displayed, you need to press the *PROCESSOR A/B* key. If the H8000FW is currently running a monolithic program (no "**A:**" or "**B:**" in the upper left corner), a "non-monolithic" program will load into DSP A and the "Thru"' program will be loaded into DSP B.

Some larger programs, those not marked with a "**96**," will be unavailable for loading when the system is using a high sampling rate. Programs using the (large) Sampler and Longdelay modules cannot be loaded on DSP B. If **Show** is set to **any** on the **Criteria** menu page in the PROGRAM area, these "unloadable" programs will be displayed with a line through them on the **list** menu page. To avoid seeing these programs when they can't be loaded, set **Show** to the default setting **loadable**.

The last few programs that were loaded are also saved in the "**Most recent**" group. This means that you can quickly revisit the programs that you are currently using, without having to look through all the programs to find them again. You can find this list (and reload those programs from it) by setting **Search By** to **User Grp** on the **Criteria** menu page in the PROGRAM area. Then go to **list** and use the **‹ - -** and **- - ›** SOFT KEYS to find the **Most recent** list - it is actually the first Usergroup and is maintained by the system.

Loading a Program Remotely

There are two ways to load programs remotely. The first is via a MIDI program change message, and the second is by triggering the H8000FW to load the next or previous program in the current bank. Let's discuss them in turn, shall we?

The normal way to load a program remotely is by means of a MIDI Program Change message. A MIDI Program Change message can be sent by a MIDI keyboard, a MIDI sequencer, or a MIDI foot pedal. Using a MIDI foot pedal on stage makes loading programs a breeze.

Unfortunately, MIDI Program Change only supports programs numbered from 0 to 127. Since the H8000FW has well over a thousand programs, each with a three- or four-digit number, this presents a small problem. One way one to get around this limitation is by using a "MIDI map" to translate between program numbers with MIDI Program Change numbers.

The H8000FW can use its Usergroups as MIDI maps. Each program in a Usergroup can have a Program Change number associated with it, so that if this number is sent by a MIDI controller, that program will be loaded. If a program exists in both 48kHz and 96kHz versions, the one most appropriate to the current sample rate setting will be chosen.

→ See Categorized by You (User Groups) on page 120.

This is extremely handy! You can use the **usergrp** menu page in the PROGRAM area to assign programs to any of ten "user groups" in User Memory and another ten on the Memory Card. Maybe you want to "group" all the programs associated with a certain project for ease of access later on. Maybe you want to keep track of programs you really like.

First use the KNOB to select the group you want to change on the top line.

Then, to find an empty place to put it, use the KNOB on the third line (**Prog Chng**) until the Preset in the second line shows **‹none›** or **‹empty›.**

Then, on the second line, choose the program you want to include in the group. Here we've included the program **4_ReverseTetra** in **Group7**. You'll see that you can usefully organize programs via user groups! To remove a program from the Usergroup, either turn the wheel at the second line to select another one, or type **0 ENT** on the numeric keypad to set it to **‹empty›.**

The second line of this screen shows the programs according to the Search and Sort options on the **Criteria** page. The wheel or keypad can be used to move through them in the same way as on the **list** screen. A tip - it's easier to find things by name using the knob if you have previously set **Sort By** to **Name** on the **Criteria** page.

Note that Usergroup 1 is a Factory group, with a selection of the more interesting programs in the H8000FW. This group cannot be changed. The presets included in it can be found in the H8000FW Presets Manual.

The third line, **Prog Chng** allows you to assign a MIDI Program Change value (0-127) to each program in a Usergroup. This allows Usergroups to be used as MIDI maps, enabling their members to be loaded via MIDI program change messages. If you are not using the Usergroup as a MIDI map**,** think of this as a "slot" number.

The bottom line of this screen also appears on the SETUP/MIDI screen (shown below) and tells you which group is the current active MIDI map. If the selected group (**Group 7** in the example shown above) is the active one, it will show **(MIDI map).**

In order for the MIDI map feature to be operational, the parameter **MIDI** on the first **midi** menu page in the SETUP area must be set to **enabled**, and the parameter **MIDI map** on that menu page must be set to the number of the Usergroup that you wish to use as the MIDI map. The default setting is that of the **Factory** Usergroup, group 1.

If no MIDI map is selected (**none**), the program loaded by a MIDI program change message will be in the same bank as the one currently selected on the visible DSP.

For example, the PROGRAM screen to the right shows that program 1410 is currently selected for DSP A. This means that the current bank is 14, covering programs from 1400 to 1499. If a MIDI program change message of 32 is received, the H8000FW will load program 1432 into DSP A.

If the parameter **omni mode** is set to **on,** the program will be loaded into the current DSP.

Alternatively, if **omni mode** is off, a MIDI Program Change message sent using the **base channel** will cause the program to be loaded in DSP A, while a MIDI Program Change message sent using the channel one greater than the **base channel** will cause the program to be loaded in DSP B. The system will be switched to A or B as appropriate, just as if the PROCESSOR A/B button were pressed. The normal rules of course apply, so that if you try to load a "monolithic" program, it will always load into DSP A.

Note that MIDI Controller #0 (Bank Change) will allow you to set the bank remotely.

All the above parameters are found on the "second" **midi/ext** menu page in the SETUP area.

Note: *To aid in troubleshooting, you can use the BUSY LED as a "MIDI chaser." With the Memory Card removed, any MIDI signals sent to the MIDI In port cause the BUSY LED to flash. If you're trying to send MIDI Program Change messages to the H8000FW, but the BUSY LED isn't flashing when you do (and the Memory Card is removed!), you know something is wrong with the connections outside the H8000FW.*

Triggering the Next or Previous Program to Load

The H8000FW can also advance to the next program displayed on the **list** menu page in the PROGRAM area (relative to the one that is currently loaded), or return to the previous program (relative to the one that is currently loaded) upon receipt of a "trigger" signal. This will act upon the currently displayed DSP, or both DSPs in the case of a monolithic program. This feature is mainly useful for live performances where it is desired to move quickly from one known effect to another in sequence.

On the **nextprog** menu page in the SETUP area, you'll find an external trigger menu page. The "top" menu page selects a trigger to load the next program, and the "bottom" menu page selects a trigger to load the previous program (press the **nextprog** SOFT KEY to toggle between the two).

→ See *External Modulation and Trigger Menu Pages* on page 98.

The best way to use this feature is to load the programs through which you'd like to advance beforehand. Use **Save** to save each one with a successively higher number. Then place each of them in a single "user group" by using the **user grp** menu page in the PROGRAM area while each program is loaded. On the **Criteria** menu page in the PROGRAM area, set **Sort By** to **Number** and set **Search By** to **User Grp**. Then use the **‹ - -** and **- - ›** SOFT KEYS on the **list** menu page to select the group to which you assigned your programs. Manually load the first one. From there on out, you can use the trigger!

The "next" or "previous" program is constrained to what is displayed on the **list** menu page. If the currently loaded program is the "highest" program in the list, a "next" program trigger will load the lowest program in the bank. Similarly, if the currently loaded program is the "lowest" program in the list, a "previous" program trigger will load the highest program in the bank.

Saving a Program

If you've tweaked a program or created your own program, you'll probably want to store it for future use. If you've tweaked a program and don't want to overwrite the original version, you should use the **Save** SOFT KEY in the PROGRAM area. Similarly, if you've created your own program, there *is* no original version, and again you should use the **Save** SOFT KEY in the PROGRAM area. The asterisk '*' after the program name reminds you that something has changed and you might want to save.

→ If you do want to overwrite the original version of a saved program, use the <update> SOFT KEY discussed below.

The program you are saving is the one running on the currently displayed DSP. If you would like to save the program running on the DSP not currently displayed, press the DSP A/B key before pressing <save>.

Pressing the **Save** SOFT KEY results in the screen shown on the right.

The first line allows you to select which "slot" the program will be saved in. If you select an "occupied" slot, the H8000FW will ask if you want to overwrite that program when you place the CURSOR over **save** and press SELECT. If you select **yes**, the overwritten program is gone! The second line allows you to save to **Internal** memory or **Card** memory. Placing the CURSOR over **rename** and pressing SELECT allows you to rename the program (as described on page 20). Place the cursor over the **save** line and press the SELECT key to go ahead with the save. If you chicken out, simply leave this menu page without SELECTing **save**.

On the right-hand side of the screen you can see both how large the current program is, and how much space is available at the location selected by **where**.

Once you have saved the program, it will appear on the **list** menu page with a "**U**" (for User) or "**C**" (for Card) at the right- hand side of the screen to help you distinguish *your* saved programs from factory programs. Here **Robot Voice** is a "user program."

Copying Programs

To copy a program, simply load it and then use **Save** to save it where you would like the program copied to. You can copy a program from one place in internal memory to another, from one place on a Memory Card to another, from internal memory to a Memory Card, or from a Memory Card to internal memory.

The "Size" of a Program and Its Ramifications for Storage

Finite things overrun the world we inhabit. There is a limit to the space available in the H8000FW for the storage of programs. Not everything is perfect. Roughly 460 kilobytes of space is available for storing *your* programs internally. A program typically requires between 1 kilobyte and 20 kilobytes of space for storage. In the worst case that means you can store 30 programs in internal memory. A more realistic number might be 100. If that's not enough for you, don't despair! You can save programs on Memory Cards that can contain as much as 256,000 kilobytes of space! And if you fill up one Memory Card, you can always get another.

→ See ***Memory Cards*** on page 49.

Updating a Program

Like **Save**, when you press the **‹update›** SOFT KEY, you are updating the program running on the currently displayed DSP. (If you want to update the program running on the DSP not currently displayed, press the DSP A/B key.)

Updating saves any new parameter tweaks that you've made to a user program. Press the **‹update›** SOFT KEY. If a program with the same number exists in User Memory, a confirmation page comes up. The **U** shows you that you are updating the version in User Memory – a **C** would indicate it is on a Memory Card.

This feature is particularly useful if you want to "tweak" a factory program - just one key press will save your tweak with the same name and number, and it will always be displayed together with the factory program. This is possible because the H8000FW allows up to three programs for each number - one factory, one user, and one on a card. Strictly speaking, you can have four, as both monolithic and non-monolithic versions of Factory programs may have the same number.

Renaming a Program

To rename a program, simply load it and then press the **Save** SOFT KEY in the PROGRAM area. Place the CURSOR over the **rename** field and press SELECT. Change the name and select the **Enter** button to exit the typewriter. Here you changed "R**obot Voice**" to "**new Voice.**"

Back at the **Save** menu page, make sure the old program name is present in the correct "slot" - **269** in User Memory in this case. Since that's where the same program is with the *old* name, you're going to overwrite it!

Place the CURSOR over **save** and press SELECT. The H8000FW asks if what you're about to do is ok... select **Yes**.

Now the program has the new name, **new Voice**.

Deleting a Program

Because there is a finite amount of storage space in the H8000FW or on a given Memory Card, you may want to delete some of your stored programs to free up "room" from time to time. To delete a program, go to the PROGRAM area and place the cursor over the program you would like to delete. The program you wish to delete does not need to be loaded on either DSP.

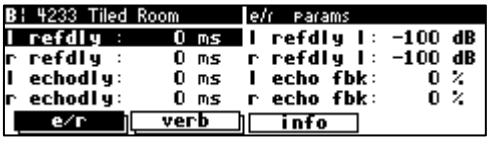
On the screen to the right, if you were to press the **‹remove›** SOFT KEY, you would be deleting the program "**Robot Voice**." (It doesn't matter that it's not currently loaded!)

Actually pressing the **‹remove›** SOFT KEY would result in the screen to the right. To remove or not to remove?

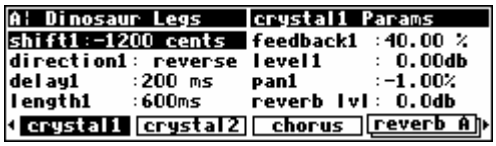
Factory presets are distinguished from your saved presets by the lack of a "**U**" at the right-hand side of the screen. You can't delete any of the factory presets. That's why **‹remove›** is scratched out when a factory program is highlighted on the **list** menu page.

"I can't tell you what a parameter is, but I'll know it when I see it." --US Supreme Court

The PARAMETER area is special in that the menus change to reflect the options available in the currently running program (on the currently displayed DSP*). The number of menu pages and their content vary from program to program. Consequently, very little can be said about parameters generally. But that's not much of a liability; parameters are easy to understand as you encounter them.



For the sake of your sanity, it's important to remember that the parameters you are messing with in the PARAMETER area belong to the program running on the currently displayed DSP*. For example, on the screen to the right you're messing with parameters for the program "**Tiled Room**" that is running on DSP B.



Continuing our example, pressing the PROCESSOR A/B key toggles the display to DSP A. Now you're messing with parameters for the program "**Dinosaur Legs**" that is running on DSP A.

Many, but not all, of the programs in the H8000FW support an "expert mode" feature. The **expert mode** parameter controlling this feature is found on the **misc** menu page in the SETUP area (you may have to press the SETUP key a few times to find it). A setting of **0** hides all but the most relevant menu pages in the PARAMETER area. Conversely, a setting of **9** reveals all of the available menu pages in the PARAMETER area. Settings between **0** and **9** reveal a proportionate amount of menu pages in the PARAMETER area.

Leave **expert mode** at **9** if you like lots of parameters to tinker with, at **0** if you find lots of parameters annoying, or somewhere in-between if your tastes fall somewhere in-between.

While most parameter types are self-explanatory, there are a few special types that deserve specific mention.

* If the upper left-hand corner of the screen reads "A," the "currently displayed DSP" is DSP A. If the upper left-hand corner of the screen reads "B," the "currently displayed DSP" is DSP B. Both DSPs are always running, but only the parameters for one of them can be displayed at a time.

Most programs that have "frequency" or "time" parameters (e.g., LFOs, reverb decays, and delays) will synchronize to the system tempo. This greatly simplifies the task of customizing a program to a particular song. Simply set the system tempo to tempo of the song you're working on and BAM! Everything falls in place!

The system tempo is defined on the **tempo** menu page in the SETUP area. In the simplest case, set **Source** to **Internal** and manually enter the appropriate **Tempo**. Alternatively, you can tap the **‹tap›** soft key to the beat and the H8000FW will calculate the tempo for you. Change the number of taps used in this calculation with the **Average** parameter.

You can derive the system tempo from several other sources by using the **Source** parameter:

Tip 1&2 A switch connected to the tip of pedal inputs 1 or 2 defines the system tempo.

MidiClock A MIDIclock signal sent from a sequencer to the H8000FW's MIDI input defines the system tempo.

ext1-8 The value of external modulators 1 through 8 defines the system tempo.
→ See *The Concept Behind "Redirection" - External Assigns 1-8 and Trigs 1 & 2* on page 108 for information regarding the external modulators.

Parameters in the PARAMETER area that synchronize to the system tempo are denoted by "**t_**" before their name, such as "**t_length**."

Notice that changing **t_length** (or any **t_** parameter) changes the corresponding **length** parameter to reflect the interaction between the musical duration (**1/8 note** in this case) and the system tempo (78 BPM in this case).

You can also override the **t_** parameter by adjusting the "naked" parameter (**length** in this case). *However, if the system tempo is changed, the "naked" parameter will revert back to its calculated value!*

If you want to make the "naked" parameter impervious to changes in the system tempo, turn the **t_** parameter to **off**.

→ See **midiClk out** on page 98 to see how to synchronize other equipment to this tempo setting.

System Timer

Much like the system tempo, the system timer provides a common reference point for measure-based parameters such as loop times (note that the system timer is used in far fewer programs than the system tempo). Set the system timer using the **timer** soft key in the SETUP area.

Let's say you want to use loops in a song with measures that are 2 seconds long (MeasureTime = BeatsPerMeasure multiplied by 60 divided by BPM). Using this nifty formula or some prior knowledge, you can simply set the **Time** parameter to **2.00 sec**. Alternatively, with **Source** set to **soft key** and **Mode** set to **restart**, you can tap the **‹run›** softkey at the beginning and end of a measure and the H8000FW will calculate the time for you.

Now load up a loop program such as "Reich Loops 2." The loop time is automatically set to the system timer (notice the lower left corner!) You can use the **timer equals** parameter to define how many bars the timer will equal. Not all loops are set up to work with the system timer - only those that explicitly show the system timer value.

Notice also that all of the programs that use the timer can be "overridden" by simply entering a new loop time value.

Back to the **timer** menu page in the SETUP area. By setting **Source** to **tip 1** or **tip 2**, you can use a foot pedal in place of the soft key to calculate the length of a measure. Tap the foot pedal at the beginning of the measure and again at the end of a measure. By setting **Source** to **ext1**, **ext2**, ..., **ext8**, you can use any of the external modulators in a similar fashion.

→ See *The Concept Behind "Redirection" - External Assigns 1-8 and Trigs 1 & 2*" on page 108 for information regarding the external modulators. See *Foot Pedals 1 and 2* on page 94 for more information regarding the foot pedals.

By setting **Mode** to **continue**, successive "taps" of the **Source** (be it the soft key, a foot pedal, or whatever) will simply extend the current system timer without resetting it to zero.

Taps

Several programs use a tapped delay line. For a particular "tap," the UP and DOWN CURSOR keys select among three parameters:

dly **A**djusts the delay position of a particular tap (the number of milliseconds before the tap).

lvl Adjusts the level of a particular tap.

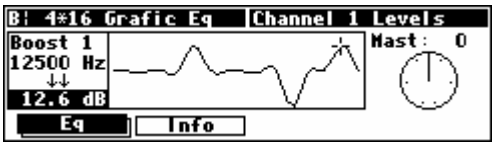
pan **A**djusts the stereo pan position of a particular tap.

Use the LEFT and RIGHT CURSOR keys to select the particular tap for which you're adjusting parameters. The graphic to the right of the parameters represents the delay position and level of every tap in the bunch.

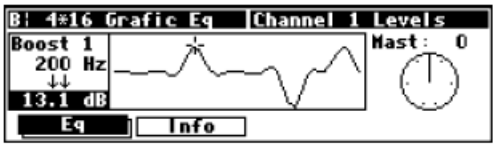
Textblocks

All right, maybe a "textblock" isn't really a *parameter*, but you'll find it hiding among parameters, so we might as well discuss it here. You'll typically find these creatures on an **info** menu page in the PARAMETER area. As the name suggests, this is just a block of text that you can read for your own enlightenment. If all of the text fits on the screen, that's the end of the story. If, however, all of the text *doesn't* fit on the screen, you'll see a double-headed arrow to the left of the text.

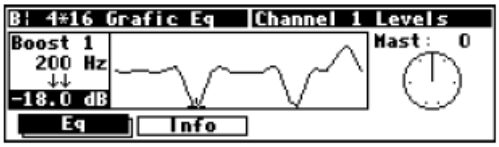
Turning the KNOB scrolls the text so you can read the rest.



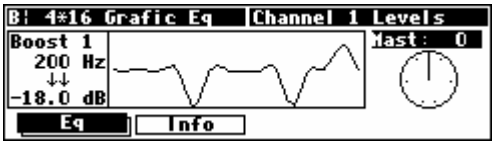
Several programs use an interface reminiscent of an analog graphic equalizer. Two parameters are used: an *x* value and a *y* value. The *x* value is the horizontal position of the currently selected graphical point, and the *y* value is the vertical position of the currently selected graphical point. In our example to the right, the *x* value is **12500 Hz**, and the *y* value is **12.6 dB**. With the cursor in the *y* field (as shown above), the LEFT and RIGHT CURSOR keys change the *x* value, while the KNOB and NUMERIC KEYPAD change the *y* value. With the cursor in the *x* field, the LEFT and RIGHT CURSOR keys, the KNOB, and the NUMERIC KEYPAD all change the *x* value. Use the UP and DOWN CURSOR keys to move between the graphic interface and other parameters on the screen.



For example, pressing the LEFT CURSOR key several times on the above screen would change the *x* value and result in the screen to the right.

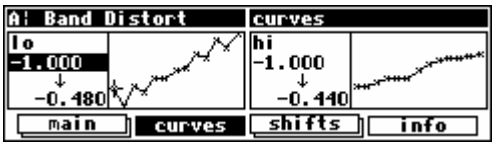


Spinning the KNOB on the above screen would change the *y* value and result in the screen to the right.



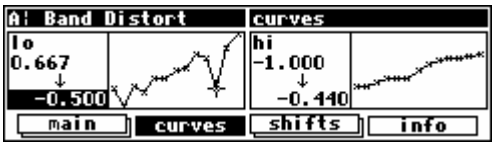
Pressing the DOWN CURSOR key on the screen above would move the cursor from the graphic interface to the **Mast** parameter.

"Curve" modules behave just like "graphics," but their function is a little different.



Here we have loaded the program "**Band Distort**" from the "**Inst - Distortion**" bank. On the **curves** menu page in the PARAMETER area, we find two "curves." Think of the audio signal being processed by this program as ranging in amplitude from -1 to 1. The "curve" sets up an arbitrary relationship between the input amplitude and the output amplitude. The *x* value is the input amplitude, and the *y* value is the corresponding output amplitude. In the example above, an input amplitude of **-1.0** results in an output amplitude of **-0.480**. By making the input amplitude slightly different from the output amplitude, you can obtain a subtle distortion.

We could get a little wackier. How about making an input amplitude of **0.667** result in an output amplitude of **-0.5**? No sweat. By making the input amplitude radically different from the output amplitude, you can obtain a "garbage compactor" distortion.



Storing and Loading Setups

As you will have deduced from reading the foregoing text, there are many adjustments you can make to the H8000FW. Wouldn't it be nice if you could save them somewhere, either to get back to the same state at a later date, or to make another H8000FW behave the same as yours? You can!

Access the Routing Storage area by *holding down* the PROGRAM key for one second. The LED next to the PROGRAM key will begin to blink and the upper right-hand portion of the screen will read "**Routings**."

Next, release the PROGRAM key and then hold it down for another second. Now, you have reached the Setup Storage Area and the upper right-hand portion of the screen will read "**Setups**."

Here we find seven SOFT KEYS which in general behave as they do in the PROGRAM area, except that PROCESSOR A/B has no effect.

list **L**ists saved setup configurations for loading.

Criteria **A**llows you to sort through saved setups by number, name, and location (internal or card).

Save Saves the current setup in a new "slot" or by overwriting another setup.

‹update› Saves routing configurations to user memory.

‹remove› Deletes stored setup configurations from memory or card.

← and → Arrow soft keys.

→ See ***Loading Programs*** on page 38, ***Saving a Program*** on page 129, and ***Deleting a Program*** on page 132 for more details.

→ To change the "one second hold time," see ***Miscellaneous Setup Options*** on page 140.

There is one difference between saving a Setup and saving a Program. It is possible to choose whether, when the setup is reloaded, it will automatically load the programs that were loaded when it was saved. This brings the machine state as close as possible to that when it was saved. To do this, set **with programs** to **yes**.

A few things to be aware of:

- The programs are not saved as part of the setup, so they must still exist on the machine.
- The current routing is always saved as part of the setup.
- After loading a setup, a small number of non-critical settings, such as screen brightness, will not be restored until the system is restarted.

Miscellaneous Setup Options

This menu contains a number of assorted setup options that are unrelated to the other pages.

Key hold is the time for which a key must be held down to trigger Key Hold functions, such as:

Routing Storage on page 14

Setup storage on page 15

Remote Controlling Parameters on page 113

Expert mode allows more or less information to be displayed on certain programs, as well has hiding some warning messages, depending on its setting. For more information, see page 43.

wheel speed this controls how "quickly" the wheel changes parameters. High values result in quick changes; low values in slow changes - 100% is the normal setting.

Appendix A -Utilities

Transmitting and receiving Data

Setting Up the Serial Port

The serial port can be used to transmit data between the H8000FW and a computer. It is an IBM PC type RS232 connector, which looks like a modem or printer to a connected computer. You can set up the serial port's parameters on the "third" **midi** menu page in the SETUP area. Repeatedly press the **midi** SOFT KEY until you see the menu page shown to the right.

The first parameter, **serial**, determines whether the serial port is **enabled** or **disabled**. If set to **disabled**, messages will neither be sent out the serial port nor accepted at the serial port. The second parameter, **baud rate,** determines the speed at which messages will be sent out the serial port *and* the speed at which the H8000FW expects to receive messages at the serial port. Similarly, **data bits**, **stop bits**, and **parity** all describe aspects of the messages sent out the serial port *and* aspects of the messages that the H8000FW expects to receive at the serial port.

For things to work properly, these last four parameters must be set to the same values on both the H8000FW and the machine connected to the serial port. Higher **baud rate**s result in faster transmission times, but most machines have a ceiling above which errors occur. So, set the **baud rate** to the highest value you can on both the H8000FW and the machine connected to its serial port that results in error-free transmissions.

The **data bits** are normally set at **8**, the **stop bits** are normally set at **2**, and the **parity** is normally set at **none**. You should only need to stray from these values if the device the H8000FW is communicating with is constrained to some other values. If that is the case, change the values on the H8000FW to match the other device.

To aid in troubleshooting, the BUSY LED will illuminate when data is transferred at the serial port, provided no Memory Card is in place. *If the serial port is "enabled," messages sent out the MIDI Out port are also sent out the serial port. Note: If both the serial port is "enabled" and MIDI is "enabled," a*

command received over either the serial port or the MIDI In port causes the port not *receiving the command to be ignored until the command is complete.*

The pin-out for the serial port is:

1 DCD	
2 RXD	6 DSR
3 TXD	7 RTS
4 DTR	8 CTS
5 gnd	9 nc

For most applications, only pins 2, 3, and 5 need to be connected.

Dumping Data and Receiving Data Dumps

You can "dump" data from the H8000FW for external storage or for use in another H8000FW. To dump, go to the **dump** menu page in the SETUP area. The dumped data will be system exclusive and will be sent out the MIDI Out port and the serial port. None of the MIDI parameters on the **midi** menu page in the SETUP area has any bearing on dumps except for the **device ID**. The **device ID** is used as part of the system exclusive messages in the dump. While the dump is occurring, a running display of the number of bytes sent is presented for those keeping score at home. You can reload the dumped information into the H8000FW by presenting it at the MIDI In port or the serial port *(provided **system exclusive** is set to **on** and **MIDI** is set to **enabled** on the **[midi]** menu page in the SETUP area).* Let's look at the five "types" of dumps.

dump program This function dumps the currently running program on the DSP referred to by the upper left-hand corner of the screen(*press the DSP A/B key to toggle the display*). If received at the MIDI In port or at the serial port, the H8000FW will load the received program into the currently displayed DSP (*press the DSP A/B key to toggle the display*).

dump setup This function dumps the state of the H8000FW, covering all of the parameters covered in the SETUP area except for routings.

dump files This function dumps all *setups*, *programs,* and *routings* stored in internal memory. *Note: The factory presets are not dumped by this function.* If received at the MIDI In port or at the serial port, the H8000FW will erase all of your saved setups and saved programs and replace them with the received setups and programs. (Note: The current setup and the currently running programs will not be altered.)

dump card This function dumps all setups and programs stored on the Memory Card. If received at the MIDI In port or at the serial port, the H8000FW will erase your Memory Card and replace its contents with the received setups and programs. If there is no Memory Card in place or if the Memory Card is too small, the incoming data is ignored.

dump internal This function dumps the contents of the internal memory. This is the same as using **dump files**, **dump setup**, and **dump program** for each DSP. It dumps all the setups and programs stored in internal memory, along with the current setup and the programs running on DSP A and DSP B. If received at the MIDI In port or at the serial port, the H8000FW will replace all of its setups and programs, load the two new programs on their respective DSPs, stop all operations and start as if from power-up, using the new setup and programs.

If the device to which you sent the dump has the ability to send it back again (such as a sequencer), you can use this as a way to "back up" your H8000FW.

***WARNING**: If, for any reason, this dump gets corrupted in some way and you send it back to the H8000FW, you will lose all the information you are trying to back up, as well as the H8000FW's contents. If you do a "backup" in this way, especially to a computer, it would be a good idea to do it twice, to two separate files, and then to compare the files. If they are identical, it's a good indication that the data sent from the H8000FW has been recorded accurately.*

Controlling One H8000FW from Another H8000FW

The H8000FW can send system exclusive messages detailing all changes to its parameters, both effects-program specific and SETUP values. The H8000FW is designed so that a sequencer can receive and then play back these values to the same the H8000FW, but we can also use this feature to slave one H8000FW to another.

To slave one H8000FW to another:

set the parameter **sequence out** found on the **midi/ext** menu page in the SETUP area to **off** on the "slave."

- On the same menu page, set the parameter **sequence** to **new** on the "master."
- On the same menu page, set the parameter **MIDI** to **enabled** on both units.
- On the same menu page, set **system exclusive** to **on** for both units.
- On the same menu page, set **device ID** to a common value for both units.
- Connect either the MIDI Out port of the "master" to the MIDI In port of the "slave" or connect their serial ports. (Using the serial ports will require a special *null modem* cable, with pin 2 of each end connected to pin 3 at the other, and vice versa.)

Now, changes made on the "master" are echoed on the "slave." Be sure to leave **sequence out** to **off** on the "slave" or MIDI "feedback" will lock up the H8000FWs in a very bad sort of way.

Sending A Program From One the H8000FW to Another

To send a program from one H8000FW to another, turn **sequence out** to **off** on the **midi/ext** menu page in the SETUP area on both H8000FWs. On the same menu page, change the **device ID** of each the H8000FW so that they agree. Then connect their serial ports or connect the MIDI Out port of the "sender" to the MIDI In port of the "receiver." Make sure the program you would like to send is running on the currently displayed DSP* on the "sender" (*press the DSP A/B key to toggle the display*). Make sure that the DSP you would like to run the program on in the "receiver" is the currently displayed DSP* (*press the DSP A/B key to toggle the display*).

→ To read about using the serial ports, see *Setting Up the Serial Port* on page 141.

On the "sender," highlight **dump program** on the **dump** menu page in the SETUP area and press the SELECT key. The program will be loaded on the "receiver." Before doing anything else, you should change the **device ID** of one of the H8000FWs so that it is no longer the same as the **device ID** of the other. Failure to do so *could* cause problems later if **sequence out** gets set to **on** on both H8000FWs!

---

* If the upper left-hand corner of the screen reads "A," the "currently displayed DSP" is DSP A. If the upper left-hand corner of the screen reads "B," the "currently displayed DSP" is DSP B. Both DSPs are always running, but only the parameters for one of them can be displayed at a time.

Most MIDI sequencers will receive system exclusive messages and store them for later playback on the originating instrument. The H8000FW fully supports this. Instead of sending keyboard presses and knob turns, the H8000FW sends "parameter change messages." When a sequencer sends a "parameter change message" back to the H8000FW, the corresponding parameter is adjusted. This is true whether the display is showing the parameter or not. Further, you can operate the front panel of the H8000FW as you normally would *while* it's receiving "parameter change messages" from a sequencer.

The H8000FW uses a "new" ASCII-based sequencing protocol that is superior to the "old" protocol found on earlier Eventide products. When you turn sequencing on, you can select which of these protocols to use. Unless you're reading an old sequence or have to ensure compatibility with older machines, we suggest you use the "new" protocol.

To actually sequence, set **sequence out** (on the **midi** menu page in the SETUP area) to **new**. Every time a parameter is changed, a corresponding message is sent out the MIDI Out port and the serial port as a system exclusive message. By recording parameter changes to a MIDI sequencer, you can automate your mixdowns.

Simply play back the recorded MIDI sequence at the H8000FW's MIDI In, and you will see the changes you recorded "played" by the sequencer *(*assuming MIDI is enabled, system exclusive is on, the programs that were loaded when the sequence was recorded are loaded during playback on their respective DSPs, and the device ID set during recording is set during playback*)*. However, if you manage to configure the MIDI connections between your various pieces of equipment such that the "system exclusive, sequence out" MIDI messages of the H8000FW loop back into the H8000FW without delay, digital demons will unleash a raging fury inside your helpless H8000FW. So, make sure that doesn't happen! If you aren't actively using the **sequence out** feature, it's wise to leave it **off**. Leave sequence out on and system exclusive off while recording a sequence, and sequence out off and system exclusive on while playing the sequence back unless you require the "echo" feature discussed below..

All adjustments made to the H8000FW while the parameter **sequence out** is set to **on** are sent out the MIDI Out port and the serial port (not including Patch Editor commands). This includes any changes received at the MIDI In port. If the MIDI sequencer is sending data to the H8000FW and receiving data from the H8000FW *at the same time*, it will receive an "echo" of the commands it sends to the H8000FW. This means that if you change something on the H8000FW while sequencing (and echoing),

then your changes will also be sent with the echo information to the sequencer. This might be useful for editing or touching-up a sequence.

The sequence out capability can also be used to allow one H8000FW to control another. Connect the MIDI out from the master to the MIDI in of the slave, and the slave will follow the master. Similarly, connect the MIDI thru of the slave to the MIDI in of a third H8000FW, and it too will follow the master.

Connecting user-supplied crystals and external clocks

User-supplied Crystal Oscillators (H8000 and H8000A only)

A user-supplied crystal oscillator may be installed to give sample rates beyond those offered by the H8000, such as 32kHz or 44.056kHz. This oscillator should be installed in the socket at location Y401 on the H8000's motherboard. The oscillator should run at 256 times the desired sample rate and should be similar to the "Fox" 1100E type used elsewhere on the motherboard. (Fox Electronics, Florida, tel: 813 693 1554.)

See ***Miscellaneous Setup Options*** on page 140 to enable the use of User-supplied Crystal Oscillators.

Since this socket connects directly to the H8000's internals, incorrect usage may damage the H8000's circuitry and is NOT covered by the Warranty.

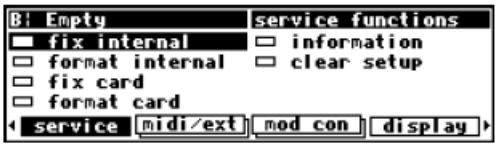
Pin Connections (based on 14 pin DIP socket)

(1) no connection (8) output

(7) Ground (14) 5v at 100mA maximum

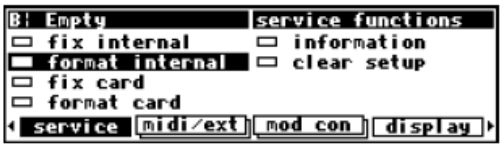
Fixing Internal Memory Problems

The H8000FW uses solid-state memory circuits to store programs, the routing configuration, and setup. These circuits use a long-life battery to keep them alive while the H8000FW is turned off. Whenever the computer in the H8000FW updates that memory, it performs an operation called a "checksum" and stores the result. A checksum is a calculation whose result characterizes what is stored in memory. A second run of the checksum calculation should result in the same characterization, *if the memory hasn't changed.* When the H8000FW is turned on, it runs a checksum calculation on the memory and compares the result against the stored result. If there is a discrepancy, the H8000FW reports an error.



In the unlikely event that an "internal memory checksum error" occurs, there may be a critical problem with what is stored in memory. The service function **fix internal** on the **service** menu page in the SETUP area will remove the checksum error by forcing the new checksum result to be saved. This will not get rid of the corruption in the data, however.

After pressing the SELECT key on the above menu page, you will arrive at the menu page shown to the right. If you want to go ahead with the procedure, press the **‹yes›** SOFT KEY. Otherwise, press the **‹no›** SOFT KEY.



Now, you can assume that the "checksum error" was no big deal, get a cup of coffee, and go back to work (not advised), OR you can assume something nasty is going on and take immediate action (advised). Assuming you take the latter (smart) course of action, the first thing you'll want to do is to save all of your important programs, routing configurations, and setups to a card (see *Copying Programs* on page 131) or to an external storage device (see *Dumping Data and Receiving Data Dumps* on page 142).

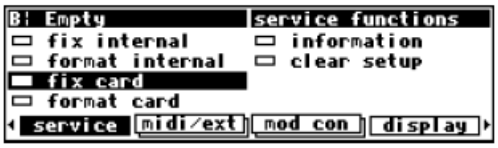
Then return to the **service** menu page in the SETUP area.

Highlight **format internal** and press the SELECT key. You'll arrive at the screen shown to the right. Pressing the **‹yes›** SOFT KEY will **delete everything *you* have stored in the H8000FW**, returning it to the state in which it left the factory. Do not do this lightly. Pressing the **‹no›** SOFT KEY will abort the mission.

Internal memory "checksum errors" should occur infrequently, if ever. Should they occur more frequently than "almost never," contact Eventide, as something is definitely amiss.

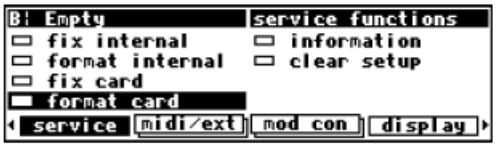
***Note** - the following only applies to PCMCIA static RAM memory cards.*

If a Memory Card "checksum error" occurs, your Memory Card has been corrupted in some way. It is possible that there is no loss of data. Memory Cards can be corrupted by static electricity, shock, a loose battery, older siblings, a weak battery, incorrect insertion into the H8000FW, use in some other computer, or a myriad of other causes. As a result, a Memory Card "checksum error" should not *immediately* send your heart into your mouth (although an internal checksum error probably should). Regardless of whether you are concerned about a Memory Card "checksum error" or not, you should "fix" the checksum.



Go to the **service** menu page in the SETUP area.

Highlight **fix card** and press the SELECT key. Press the **‹yes›** SOFT KEY to force the new checksum result to be saved. If data is in fact corrupted, this will not fix it. Press the **‹no›** SOFT KEY to abort.



If you are worried about the contents of the Memory Card, you should either dump the contents of the memory card to an external storage device (see ***Dumping Data and Receiving Data Dumps*** on page 142) OR copy all valuable internal programs and routing configurations to a different Memory Card, copy the faulty Memory Card's programs and routing configurations to internal memory and then to another Memory Card (see ***Copying Programs*** on page 131).
Finally, return to the **service** menu page in the SETUP area.

Highlight **format card** and press the SELECT key. Pressing the **‹yes›** SOFT KEY will erase the contents of the Memory Card and reformat it. Press the **‹no›** SOFT KEY to abort.

You might also put a label on the card (using adhesive tape, indelible marker, etc.) indicating the date and that a problem occurred. Keep track of this kind of problem and make multiple backup copies. Have you been introduced to Mr. Murphy? He's got this law that says . . .

Changing the Internal Battery

A small button-type battery is mounted internally and powers the H8000FW's memory when the power is off. This should last about five years before it needs to be changed, longer if the H8000FW is left powered up much of the time. The number of hours for which the unit has been operating, powered and unpowered, can be found under SETUP/service/information.

This battery should be replaced by a **qualified technician only** since it must be replaced when the H8000FW is powered up in order to preserve the internal memory contents. Contact your Eventide Service Center to have this battery replaced.

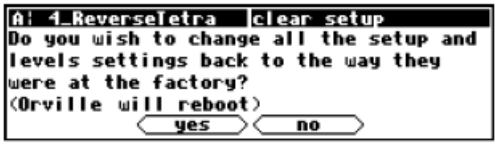
IMPORTANT SAFETY NOTICE FOR LITHIUM BATTERY:

- Danger of explosion if battery is incorrectly replaced.
- Replace only with same or equivalent type recommended by manufacturer.
- Dispose of battery according to manufacturer's instructions.

Clear Setup

At the factory, all of the adjustable parameters in the H8000FW are set to nominal values called "factory defaults." To return these parameters to their "factory defaults," go to the **service** menu page in the SETUP area. The parameters affected include:

- everything in the BYPASS area.
- everything in the LEVELS area.
- everything in the SETUP area.

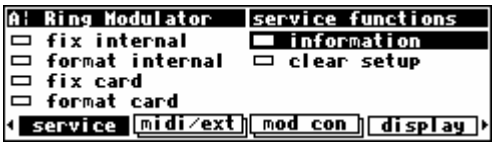


Highlight **clear setup** and press the SELECT key. Pressing the **‹yes›** SOFT KEY will replace current parameter values with the "factory defaults." Unless you saved your setup before pressing <yes>, it will disintegrate into digital dust (*see* ***Storing and Loading Setups*** on page 139). Press the **‹no›** SOFT KEY to abort. If the H8000FW ever gets "buggy," try using **clear setup** before you do anything more "drastic."

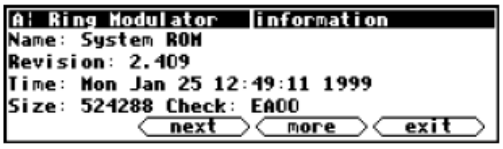
Alternatively, you can clear the internal setup by holding down the SETUP key during startup.

-> See ***Start-Up Options*** on page 154.

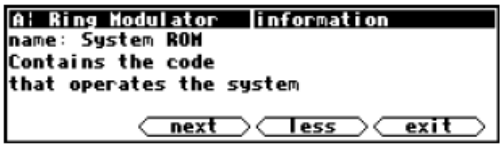
If the system detects that a new version of software has been installed, it will ask you if you wish to perform a **clear setup** - you should almost always answer **yes**, as the old setup may not be compatible with the new software.



The H8000FW has expansion and upgrade capabilities. "Information" menu pages allow you to keep track of what options are inside an H8000FW without having to open the box. To access the "information" menu pages, go to the **service** menu page in the SETUP area.



Highlight **information** and press the SELECT key to get a screen that looks something like the screen to the right.



The **‹more›** SOFT KEY reveals additional information pertaining to the current page. The **‹less›** SOFT KEY returns from the additional information.

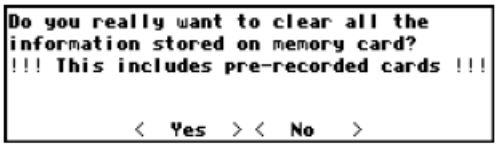
The **‹next›** SOFT KEY advances to the next menu page, **‹last›** returns to the previous menu page, and **‹exit›** returns to the **service** menu page in the SETUP area.

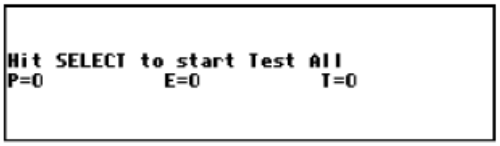
One important piece of information to be found in this area is your H8000FW's *Electronic Serial Number,* which is the first 8 digits of the **Hardware ID** number on the screen to the right. You may be asked for this by a dealer or an Eventide representative. The **Time/Date** figures are not currently used, so their values are unimportant. The **Hours total/power** refer to the total number of hours that have elapsed since the unit was built (**1248** in this case), and the total number of hours the unit has been powered (**206** in this case). A brand-new unit may show as many as 300 powered-up hours to cover burn-in and factory testing.

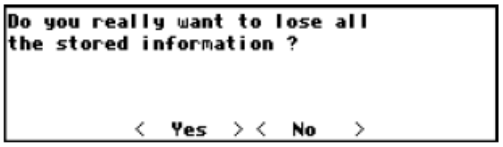
Start-Up Options

There are several "secret keys" that can be depressed during startup to perform special functions. These keys should be pressed and held down during the second "start-up screen" - the one with the " H8000FW" in large text. You can release the key once the appropriate "special screen" appears.

Special Key	*Function*
-	Erase the Memory Card. Press the **‹Yes›** SOFT KEY to go ahead or **‹No›** to abort.
CXL	Bypass start self tests. The H8000FW will skip from "Powering On..." directly to "Initializing." When the "Initializing..." message appears, you can let go of the CXL key. This facility is a timesaver to allow the H8000FW to powerup more quickly.
5	Run factory self test programs (**do not play with these, as some can erase internal memory, setup, and programs.)**
2	Used to update the H8000FW's software using a Memory Card or the Windows-based Oupdate program.
8	Clear internal programs and setup. This key does the same thing as **format internal** on the **service** menu page in the SETUP area. The purpose of this special key is to initialize the unit at the factory, and to fix a memory problem that might prevent the unit from working correctly. Press the **‹Yes›** SOFT KEY to go ahead or **‹No›** to abort. The need for this operation should be quite rare. If problems arise that require its use more that once, the factory should be contacted. Be aware that this command will delete all User presets.







PROGRAM

Loads "**Mute**" into both DSPs instead of their current programs. Press the **‹Yes›** SOFT KEY to go ahead or **‹No›** to abort. This function is used in the event that one of the last-run programs caused the unit to lock up, usually at startup.

setup

Clears the internal setup and resets parameters in BYPASS, SETUP, and LEVELS to their factory default values. This is an excellent first step if your H8000FW starts acting funny (but you don't know why, 'scuse me while I...). Alternatively, you can use the **service** menu page in the SETUP area to clear the setup.

Connecting AES 11 thru 18 to the H8000FW

AES/EBU signals 11 to 18 are connected by means of a DB25 multi-pin connector. Adaptor snakes for this connector are available from several sources. One example is "DB25-XLR M+F AES/EBU DigiSnake," available from Digidesign Inc's on-line store, reachable from http://www.digidesign.com.

For installation purposes this connector can be wired as shown below:

AES11/12 IN+	24		
AES11/12 IN-	12	AES13/14 OUT +	4
AES11/12 IN GND	25	AES13/14 OUT -	17
		AES13/14 OUT GND	5
AES13/14 IN+	10		
AES13/14 IN-	23	AES15/16 OUT +	15
AES13/14 IN GND	11	AES15/16 OUT -	3
		AES15/16 OUT GND	16
AES15/16 IN+	21		
AES15/16 IN-	9	AES17/18 OUT +	1
AES15/16 IN GND	22	AES17/18 OUT -	14
		AES17/18 OUT GND	2
AES17/18 IN+	7		
AES17/18 IN-	20		
AES17/18 IN GND	8		
AES11/12 OUT+	18		
AES11/12 OUT -	6		
AES11/12 OUT GND	19		

Appendix B-Using the H8000FW with a computer

This section of this manual covers use of the H8000FW with a PC or a Macintosh. If you don't plan to use your H8000FW with a computer you don't need to read it unless interested. We apologize to those readers already familiar with the following subject matter.

Before the H8000FW can be used to connect to a PC or Mac, suitable device driver software must be installed as described in the following chapters. The necessary software will be found on the included "H8000FW Drivers" CD. The purpose of these drivers is to tell the computer about the H8000FW and how to talk to it.

From time to time the drivers will be upgraded and new ones available at www.eventide.com. These are currently available to registered owners only, so be sure to send in the enclosed registration card.

You should also be aware that in many cases new drivers must be installed in tandem with associated new H8000FW software so be sure to read all relevant release notes before installing updates.

The H8000FW can be set as a sound device on any PC running Windows XP (service pack 2 or later is recommended) or any Mac running OSX 10.4 or later. For serious multichannel use a fast computer will be necessary, such as a 2.4GHz or faster PC or a G5 Mac or better.

The H8000FW can be used with any application that supports Core Audio, ASIO or WDM devices. This will usually be a DAW application such as Logic, ProTools, Cubase or Nuendo. An example of the use of the H8000FW with Logic is provided later in this document but otherwise, questions about the operation and configuration of these applications should be referred to their manufacturer's support personnel. Eventide is not able to provide such support for non-Eventide applications.

There a few general issues that will apply to the use of the H8000FW with any workstation application or computer. Among these are:

- Making connections between the H8000FW and the computer.
- Setting the sample rate and buffer size for the system.
- Synchronizing connected audio devices.

Making connections between the H8000FW and the computer.

All recent Macs and many PCs support FireWire. Those PCs that do not support FireWire can usually be upgraded with an inexpensive plug-in card.

The H8000FW is connected to the computer using an IEEE1394A FireWire cable which is widely available from computer stores and typically ranges in length between 3 and 15 feet. Cables longer than 15 feet (4.5m) are not supported by FireWire without the use of special adaptors. This cable can be connected to either FireWire connector on the H8000FW, allowing the other one to connect to a following FireWire device if desired.

While FireWire is designed to be hot-pluggable (meaning that it can be connected to powered-on systems), Eventide recommends that where possible it be connected between units when their power is switched off. The reason for this is to avoid certain rare conditions which can damage the unit being connected.

Setting the sample rate and buffer size for the system

A number of settings can be made that affect the performance of your system. The first of these is *sample rate*, which is the rate at which the audio is converted from the analog world to discrete digital values (or the other way around). This is usually expressed in kHz or samples per second.

The sample rate is normally defined by the computer operating system or by the workstation application and can be set from a menu or dialog box. See the manual for your application to find out how to change the sample rate. You should not change the sample rate directly from the H8000FW when it is connected to the computer as this can cause problems for some applications – change it on the computer and the computer will automatically change the H8000FW setting where necessary. Higher sample rates give better audio performance but use more disk space for recording and place heavier demands upon the computer.

The *buffer size* setting determines the *latency* of the system. Latency in this context is a measure of the delay introduced by sending audio to and from a computer and an external device such as the H8000FW.

To help explain this, an analogy may be helpful. Picture a large pile of coal representing the digital information stored in the computer. Each piece is one digital value. The job here is to fill buckets (the buffers) with coal from the pile, and pass them to a colleague who then empties them into a chute leading to the outside world. The chute must be kept partially full but not allowed to overflow. The chute may be thought of as the feed to an

external digital to analog converter feeding a speaker, while the passing of the buckets represents the FireWire connection.

So, if the chute becomes empty the speaker will pop or click, while if it overflows things may get in the wrong order. It also takes time for any given piece of coal to get from the pile to the chute, as the buckets have to be filled and emptied before this can happen. This time is the latency mentioned above.

It will be apparent that the size of the buckets directly affects the latency, as smaller buckets can be filled and emptied more quickly. But, to avoid the chute becoming empty (bad!), they will have to be passed more quickly, which may be tiring. So, there is probably an optimum size for these buckets, to provide a good compromise between the latency on one side, and the energy requirement (computer power) needed to pass them.

Enough of coal for now. The latency is usually almost directly proportional to the buffer size, but the use of small buffers requires more computer power. The default setting is usually a good compromise, but if low latency is important and you have a fast computer it may pay to reduce it.

Some simple math for those so inclined: if you are running at 48kHz, a 1024 sample buffer will introduce a latency in the order of 1024/48000 seconds, or 21mS (milliseconds). So, to send and return to a FireWire device will take 42mS, which is noticeable. Those systems that offer *delay compensation* can resolve the problem painlessly, but otherwise the use of smaller buffers is worth considering.

Synchronizing connected audio devices

For audio purposes, a computer can be thought of as a device that shuffles processed data between its disk drives, memory and peripherals. As such, it neither has nor needs the concept of a sample rate (except for calculating delays or filters and such-like). This concept only becomes necessary when it is necessary to output audio to or from the outside world, in which case it is set by the hardware conversion devices.

Things become more complex when you have more than one device that cares about the sample rate because if a device gets data at the wrong sample rate it will have to drop samples or insert extra samples to keep up. This will cause clicks or distortion, depending on its severity. To avoid this, we allow one device, known henceforth as the *clock master*, to define the sample rate and any other devices have to follow its lead.

If you are using just one external audio device (or an internal one such as a sound card) everything is easy. This device becomes the clock master (usually automatically) and the computer does what it has to do.

If you have more than one device, commonly a sound card and one or more external audio thingies, life is more complicated. As before, you have to define one device as being the clock master and must synchronize the others to it so that they all run at the same sample rate. This is made more difficult by the fact that some devices (sound cards especially) cannot accept synchronization and must be made the clock master, obliging the other devices to be synchronized to them. **All audio devices used together in a system MUST be synchronized to run at the same sample rate.**

Synchronization is typically achieved by either hardware or software measures:

- Hardware synchronization is achieved by connecting AES, S/P DIF or Wordclock cables from the outputs of the clock master to a corresponding input of the other devices and configuring these devices to use this signal as a sync source.

- Software synchronization employs the use of sample rate conversion (which uses a lot of computer power) to make disparate devices compatible with the master sample rate. It is available on Macs when creating Aggregate Devices, or on some Windows applications using WDM drivers. Again, see your computer manuals for more details on these.

The FireWire link contains a sample clock to which the H8000FW can be synchronized if all other approaches fail, but this is not recommended except as a last resort as the quality of this clock is not high and it can increase jitter or other bad things. Note that on Macs this is not always available.

So, to sum up:

- One audio hardware device must be configured as the clock master

- Any other audio devices in the system must be synchronized to the clock master by (preferably) hardware or software means.

Installing Drivers on Your PC

This section describes how to install the software drivers required to operate the H8000FW Multi-Channel Effects System with your Windows XP or Vista-based PC. Those hip Mac people should skip ahead.

If you are updating your drivers with new ones, read the release notes supplied with the update. If an H8000FW update is also required, perform this before continuing.

Your Windows-XP or Vista should have the latest service packs installed. If you are not sure, go to http://update.microsoft.com/windowsupdate to check that your PC is up to date. We recommend that you keep your machine up to the standard Microsoft specification – we cannot guarantee results with outdated, beta or experimental versions of Windows.

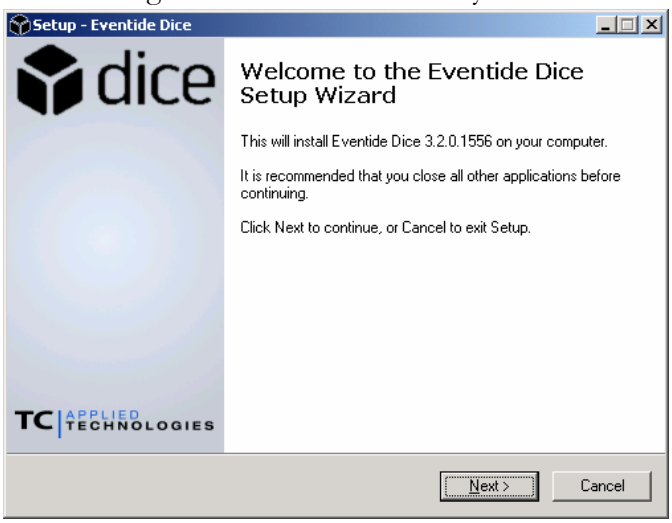
You may see cosmetic differences between the screens below and those on your computer, depending on its settings and operating system. You may also see interchangeable references to either "H8000 Audio" or "Eventide Dice."

Before starting, be sure your PC is equipped with a Firewire port. *If your PC did not come equipped with a Firewire port, you must purchase a Firewire PCI card and install it. See the recommendations under Check your FireWire Card on page 175.*

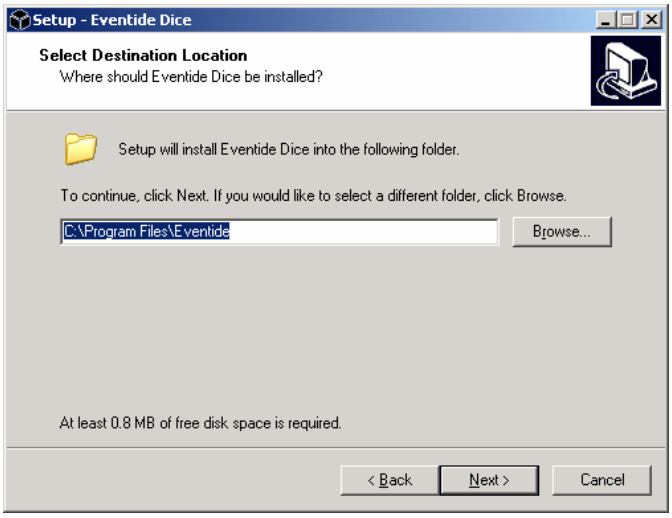
Leave the FireWire cable unconnected at this time.

- Locate the drivers file, EventideInstaller.exe (setup.exe on older drivers). This will either be on the CD supplied with your H8000FW or contained within a compressed zip file downloaded from the Eventide Web site. If the latter, open (extract) the zip file and copy the .exe file to your hard disk. The latest version of the driver can always be found on the Web Site.

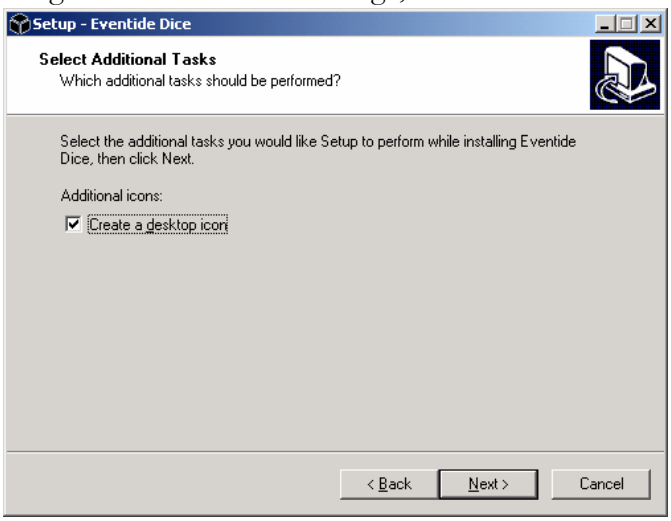
•Run the EventideInstaller.exe file by clicking on it. You will see the screen below. The long number after "Dice" may be different.



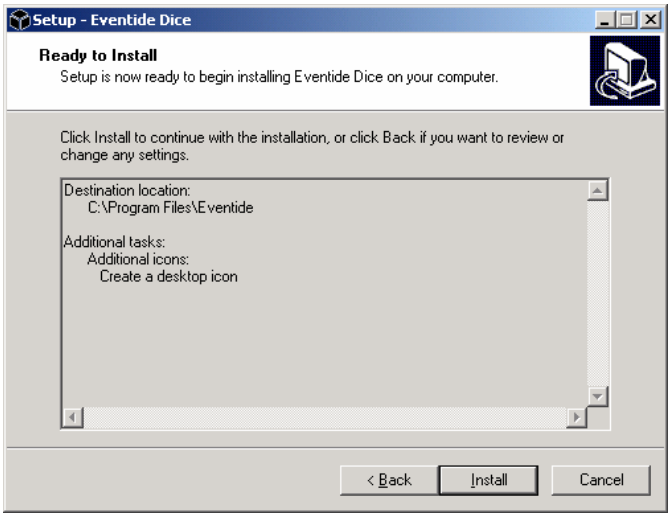
•Follow the instructions and hit Next ..



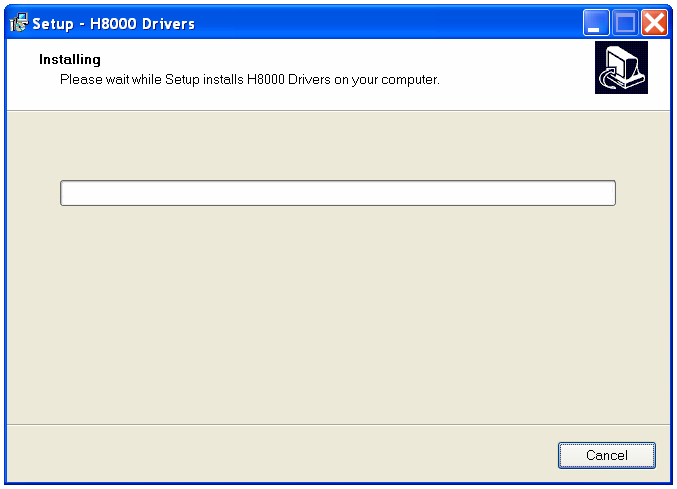
•Unless you have a real reason to do otherwise, accept the suggested folder and hit next. If you get "Folder Exists" message, answer "Yes".



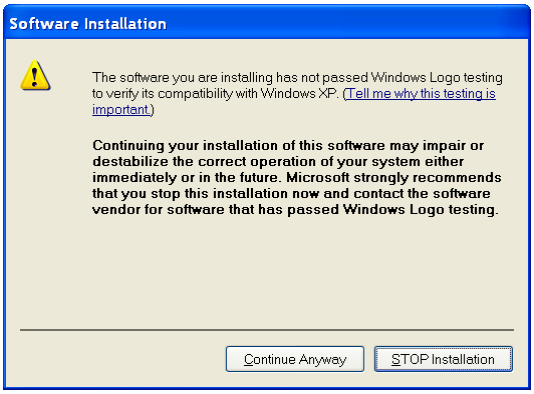
•Leave the "Create a .." box checked and hit **Next**. When you see the box below, hit **Install**.



•Please wait ….



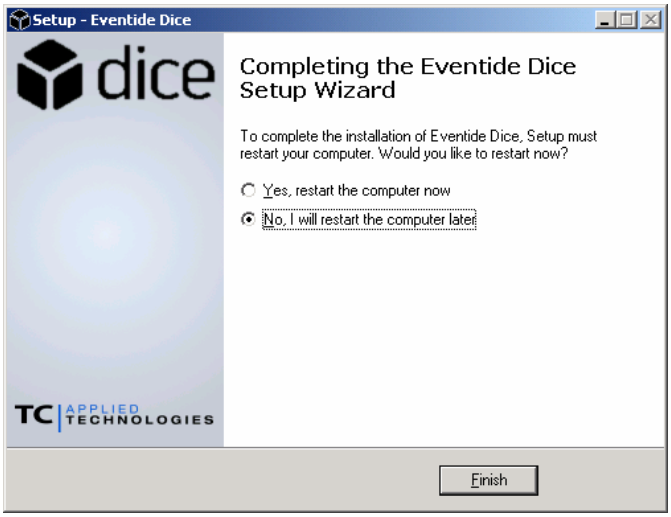
- After about a minute you will see the following screen. Hit **Continue ….**



(For the easily frightened - Windows Logo testing has various requirements that are inappropriate for professional audio equipment so these drivers do not need to comply).

A browser window will also open, showing the release notes for this version of the drivers. These show the issues resolved by this and previous driver releases. They may appear rather technical but can provide useful information.

- After about a minute, you will see the box below. You MUST restart your computer before continuing, but need not do it immediately if you have other work to do.



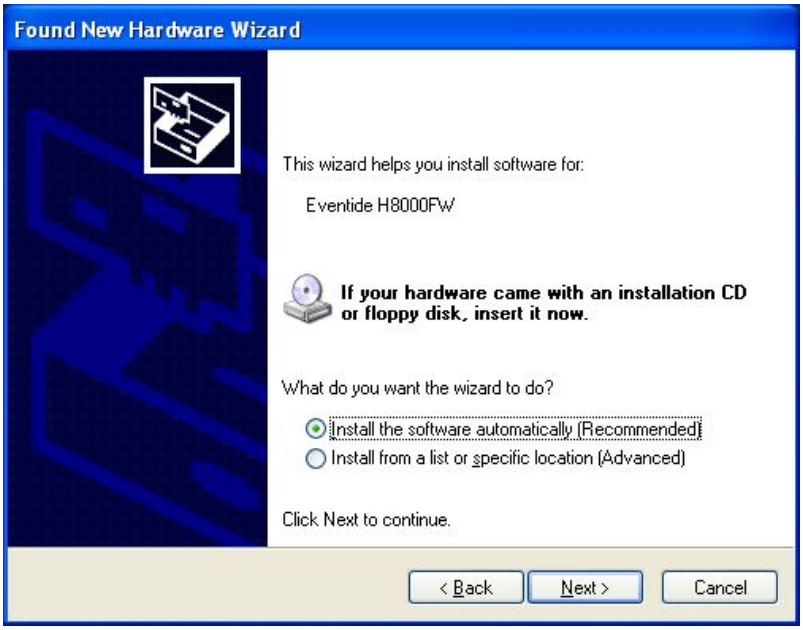
- Insert the Firewire cable into your PC's Firewire port, and the H8000FW's Firewire port, which is located directly to the right of the AC power cord port.

- Turn on the Eventide H8000FW. (Windows XP will generate a two-tone audio signal when it recognizes a Firewire connection. Similarly, when a connection is disabled or broken, it will sound a reverse two-tone signal).

- Windows will automatically detect that a new hardware device is connected., and display the first New Hardware Wizard screen:

•Click the **No, not this time** radio button, followed by the **Next** button.

•The second Wizard screen now displays:



•Make sure **Install the software automatically** is selected, then click **Next.**

•The following screen may annoyingly display again. If it does, select **Continue Anyway.**

•The installation now proceeds ……

•When the driver is successfully installed, the following screen displays:

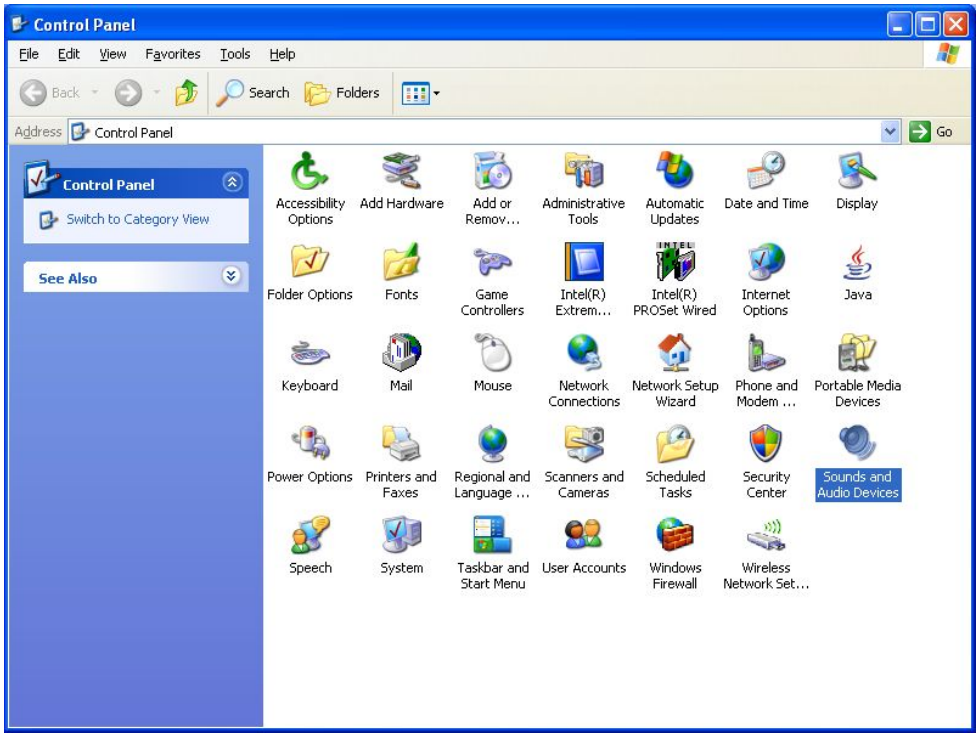
Now click **Finish.** All done. Time for a nice cup of tea.

Note: *If for any reason the drivers did not install properly, unplug your Firewire cable from your PC, wait several seconds, and insert it again. You will be prompted by the New Hardware Wizard to insert your drivers CD as outlined above. Go through the process again until you receive the Windows confirmation message that all drivers were successfully installed. If this fails, go to the* *Troubleshooting section on page 175.*

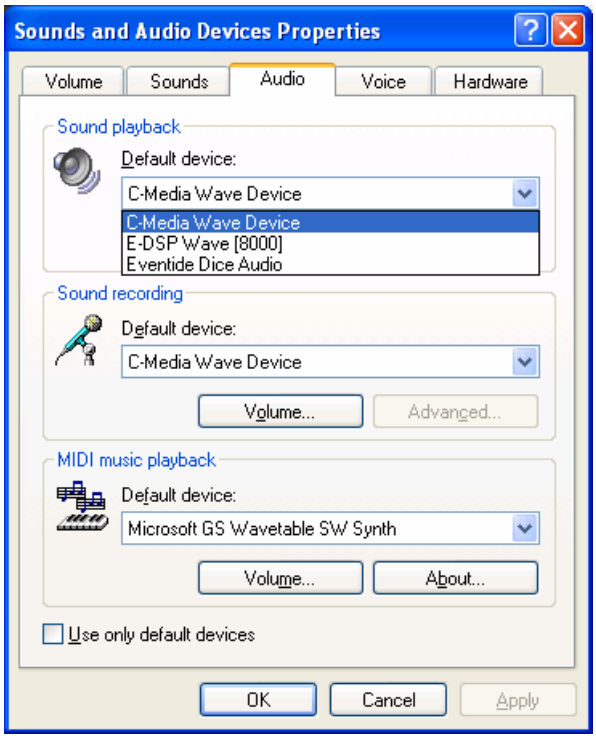
Configuring the H8000FW for PC Output

Once all software drivers have been installed, perform the following steps to enable PC output through the H8000FW.

- Go to Windows' **Control Panel,** and double-click **Sound and Audio Devices** (below):



- The following tabbed screen now displays:



- Select the **Audio** tab, then, for *Default Device,* select **Eventide Dice Audio.**

Warning: *If this option does not display in the Default Device's drop-down list, the software drivers were not properly installed. Please reinstall the drivers, as described in the previous chapter.*

- Click **Apply.** This action establishes the H8000FW as the primary output device and overrides your installed sound card. (In this example, it overrides *C-Media Wave Device;* on your machine, it will be whatever sound card is installed on your PC.)

Configuring the H8000FW for Throughput

Follow these steps to enable throughput between your PC or Macintosh and the H8000FW:

- From the H8000FW's front panel, press the **Processor A/B** control button until **A:** displays in the upper left corner of the front panel's screen.
- Next, press **Program.**
- Now, from the H8000FW's keypad, enter **12,** then **ENT.**
- Finally, press the **Select** control button.

These actions enable throughput on DSP channel A of the H8000FW.

To enable throughput on DSP channel B, repeat the steps outlined above, except when selecting the channel using the Processor A/B control button, select **B:** instead of **A:.** Otherwise, all other procedures are identical.

You must also configure throughput from the H8000FW's Routing screen.

To access the Routing screen,

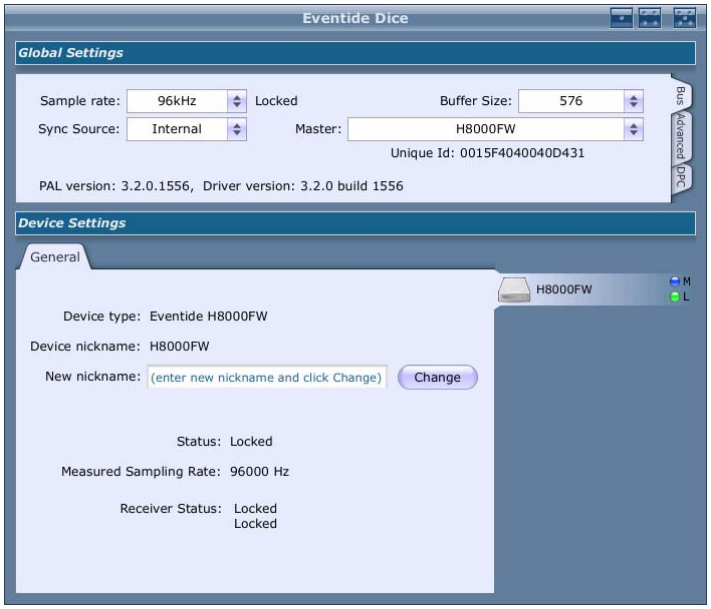
- Press the **Program** control button until it flashes; the Routing screen now displays.
- From the H8000FW's keypad, enter **14,** then **ENT.**
- Finally, press the **Select** control button.

The HW8000FW is now configured to playback audio from your PC.

To test if your connection works, go ahead and play an audio file from your PC. (For instance, go to **My Music** > Sample Music, and play either of the short audio clips there.) After you have selected an audio clip, the LED indicators on the left side of the H8000FW's front panel will light, indicating it's receiving the signal. Of course, if speakers are connected to the H8000FW you'll hear the output, too.

The Windows Control Panel

The H8000FW has a computer Control Panel that is installed by the driver which allows remote control of sample sources and some fine tuning. This may be launched from some applications or from the **Eventide Inc** section of **All Programs** under the **Start** button at the bottom left of your screen, or from a shortcut on your *desktop*. It's called **Eventide Dice**.



The Control Panel has two areas – **Global Settings** and **Device Settings**. The **Global Settings** area has three pages which can be selected by the tabs at the center right. These are *Bus*, *Advanced* and *DPC*. These will be discussed below.

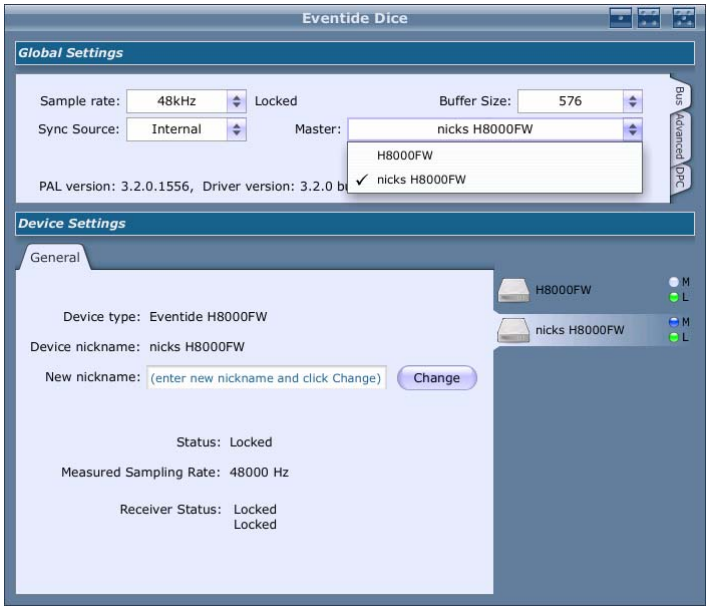
If you have multiple H8000FW units connected to your computer, the **Global Settings** apply to all of them. The **Device Settings** apply to the *selected* unit (see below), with the exception that **Sample Rate** and **Sync Source** settings only apply to the Master unit (see below).

Device Settings

Device Type

This will always be Eventide H8000FW.

Device nickname



This allows you to enter an amusing nickname for your H8000FW. These will only be meaningful if you have more than one H8000FW connected – at this time you can click on the nickname of each unit (by the green indicator) to *select* it.

It is allowable (but not greatly sensible) to give multiple units the same nickname. You can tell which is which by looking at **SETUP**clock - the **Master** unit (see below) will have the displayed **Sample Rate** (see below), while the non-Master (slave) unit(s) will be set to **FIREWIRE1**.

Status

This shows the Lock status of the *selected* machine. It should always be **Locked** – if not, find and fix the problem before continuing.

Measured Sampling Rate

This shows the measured sample rate of the *selected* machine. The **Master** unit should match the **Global Settings** value (see below). Any slave (non-Master) units may display a slightly different value – this is OK.

Receiver Status

This shows the FireWire received Lock status of the *selected* machine. It should always be **Locked** – if not, find and fix the problem before continuing.

Global Settings - Bus Page

Master

If you only have one H8000FW connected, this will always be the **Master**. Note that in this context, Master only refers to the computer-H8000FW FireWire link – the H8000FW may itself be synchronized to another source.
If you have more than one H8000FW connected, one of them will be selected as the **Master** and the others will be automatically slaved to it.

Sample Rate

The sample rate of the **Master** H8000FW may be set from here. If you change this, be sure that it matches your application or DAW project. In particular, WDM applications react badly to external sample rate setting changes.
If the lock indication to the right of this value does not say **Locked**, there is a problem that must be resolved before continuing.

Sync Source

This allows you to change the sync source of the **Master** H8000FW remotely. If you select anything other than **Internal**, it is wise to first be sure that the chosen source is solid. The **AES11/12** setting should also be used when **DIN11/12** is set to **SPDIF3/4** on the **inputs** screen.

Buffer Size

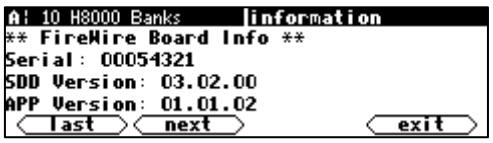
This allows you to change the FireWire buffer size. See Setting the sample rate and buffer size for the system for more information.

Unique ID

This is the FireWire serial number for the Master H8000FW. Due to the magic of computers, the last 5 digits are the serial number in hexadecimal (base-16).

PAL, Driver version

These are software version numbers for the driver and the H8000FW FireWire firmware. The first three parts of the **PAL** version are the same as the **SDD Version** shown under **SETUP service.**



Global Settings - Advanced Page

WDM Enabled

This setting allows use with applications requiring WDM drivers.

Sample Rate Change Restriction

This setting determines which if any applications may change the Sample Rate. Some WDM applications react badly to sample rate changes, but equally it may be useful to allow them to set the sample rate to match the loaded project. ASIO applications are usually more understanding.

Operation Mode

This allows you to select between **Normal** and various **Safe** modes. These modes allow you to trade latency for more reliable performance, ranging from **Normal** to **Safe Mode 3**. **Normal** will give the lowest added latency, while **Safe Mode 3** will increase latency but be less prone to dropouts when the computer is overloaded. This is described in places as the WDM Operation Mode, but applies to all drivers. See DPC below for further information.

In/Out Speaker Configuration

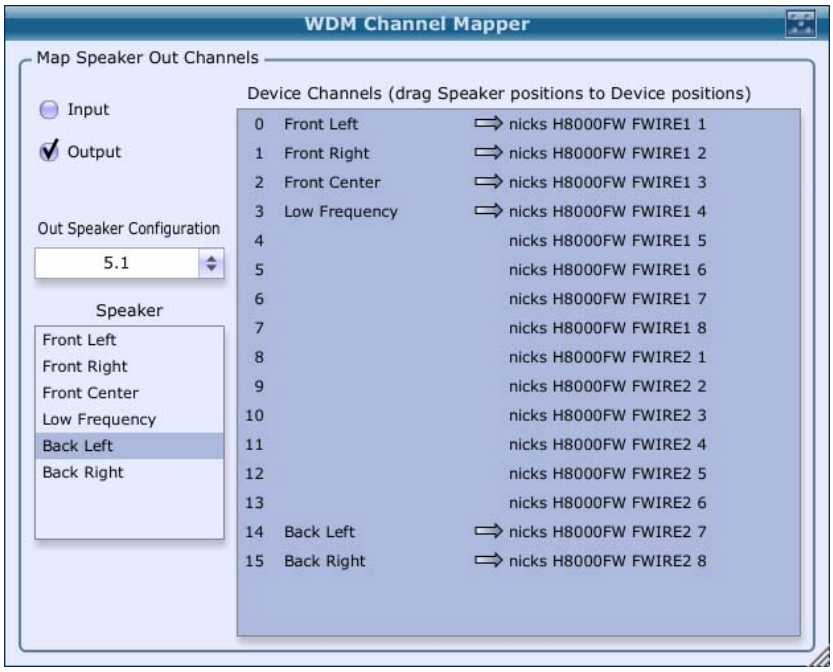
These allow you to set various WDM Channel map options. See below.

Set WDM Channel Maps

WDM applications are often mainly inclined to think in terms of sound cards, and have trouble interfacing to a true multi-channel system such as the H8000FW.

As a result the H8000FW offers some options to produce "Channel Maps", which disguise the H8000FW as the sort of configuration that the WDM application may be expecting.

Here we have an example of the H8000FW masquerading as a set of Surround Sound speakers.

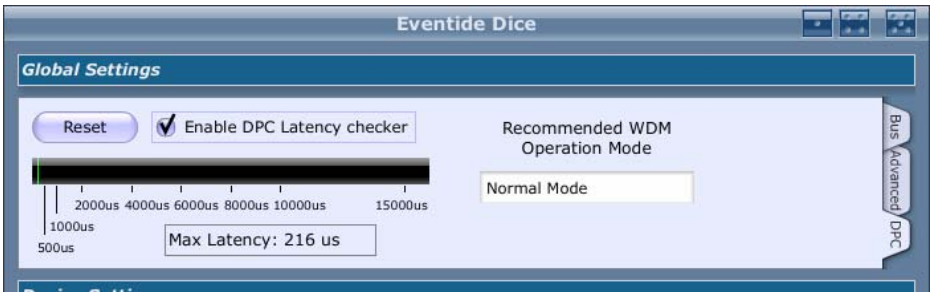


Select suitable configurations for input or output, and then click and drag from the **Speaker** list at the left to the **Device** channels table to connect the H8000FW channels to the WDM outputs or inputs. Selecting **Direct Out** connects all channels.

Global Settings - DPC Page

A Deferred Procedure Call (DPC) is a Windows driver mechanism that can consume a lot of CPU time at critical periods, which can reduce the performance and reliability of audio applications and drivers. (See http://en.wikipedia.org/wiki/Deferred_Procedure_Call for technical information). WDM systems are particularly sensitive to such problems.

Problems caused may include drop-outs, or in serious cases, Locking and Unlocking of the system. This will often be accompanied by relay clicks from the H8000FW.



To analyze these problems, this page includes a **DPC Latency checker** which can help analyze the delays introduced by DPCs.

If you temporarily enable this and let it run for long enough for any problems to have occurred, then move the cursor over the **Recommended WDM Operation Mode** field, you will be given a description of the computer's performance.

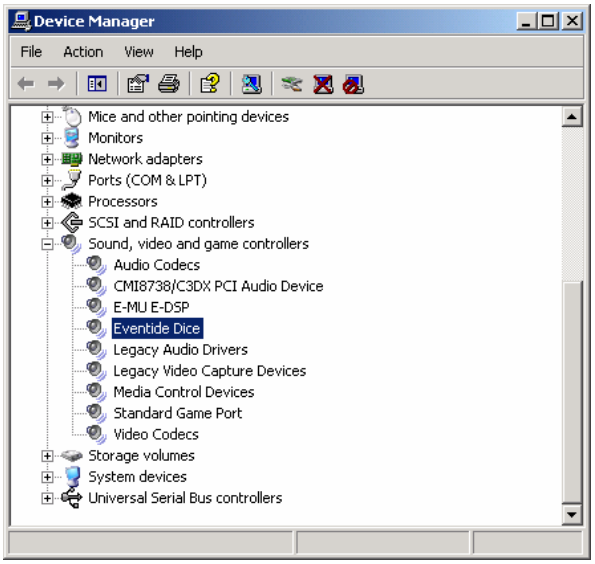
If there are problems, you will be recommended to change the Operation Mode. Be aware that the safer (higher numbered) modes will add latency, so you should try and find the source of any problems first.

You should also check that your system has the latest Network drivers. In particular, the use of Microsoft Outlook with an Exchange server (but not POP3 or IMAP) has been reported to cause significant latency increase. It is desirable to keep all network activities to a minimum when doing critical sessions.

Troubleshooting Windows systems

In most cases, the Windows drivers will install correctly, and everything will be fine. If the system does not operate as expected, here are a few things to try.

1) Manually uninstall any existing drivers. To uninstall a functioning driver, connect the H8000FW Firewire cable to your PC and power up the H8000FW. Look at Control Panel/System Properties/Device Manager under "Sound video and game controllers". You should see an entry called either "Eventide Dice" or "H8000FW".

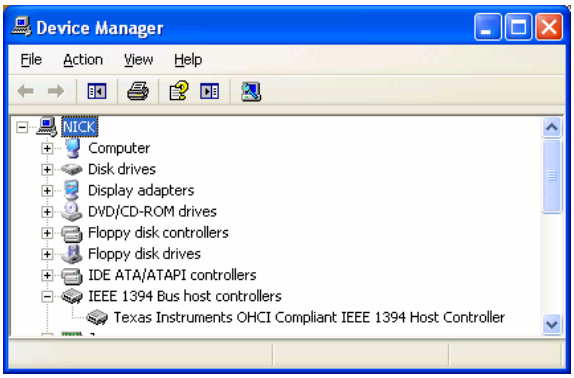


Right-click on this entry and select "Uninstall".

Then, hit the "Start" button at the bottom left of the screen and move the mouse over "All Programs". If you see an entry called either "H8000 Drivers" or "Eventide Inc" move the mouse over this and click on "Uninstall …". Answer "Yes" or "OK" where appropriate.

Then, disconnect the FireWire cable and re-install the drivers as described in Installing Drivers on Your PC.

2) Check your FireWire card. First, look at **Control Panel/System Properties/Device Manager** under "IEEE 1394 Bus host controllers", or similar. You should see the name of the manufacturer of the chip set used on the card, which should be described as "OHCI compliant". Further information may be available on the card manufacturer's Web Site (hard to find for "no-name" cards).



Eventide recommends cards using a Texas Instrument chip set. In particular, the following chip sets are not recommended for use with H8000FW:

Manufacturer	***Part Number***	***Notes***
NEC	D72873GC	
NEC	D72874GC	May fail if too many channels or other FireWire traffic
NEC	uPD72874	
VIA VT6306		Will work but with reduced performance

If you suspect that the FireWire card may be causing problems - consider replacing it – they are cheap and widely available. Symptoms may include erratic behavior or problems when using a lot of channels, or when using other devices on the same FireWire bus.

3) If you are using WDM drivers (low-cost applications on Windows), make sure that the sample (clock) rate of the H8000FW is the same value as that of your project. This will usually be one of the "internal" values.

4) Perform the DPC Latency Test described on page 174, and change the Operation Mode if recommended.

5) If possible, disconnect all network cables from your computer. Otherwise, try to prevent any network activity during important playback.

6) These drivers allow 64 bit operation on either Windows XP or Vista, but this is not commonly used and is not supported by Eventide.

Installing Drivers on Your Macintosh

This section describes how to install the software drivers required to operate the H8000FW Multi-Channel Effects System with your Macintosh. *Note that the HW8000FW is compatible only with OSX 10.4 (Tiger) or later.*

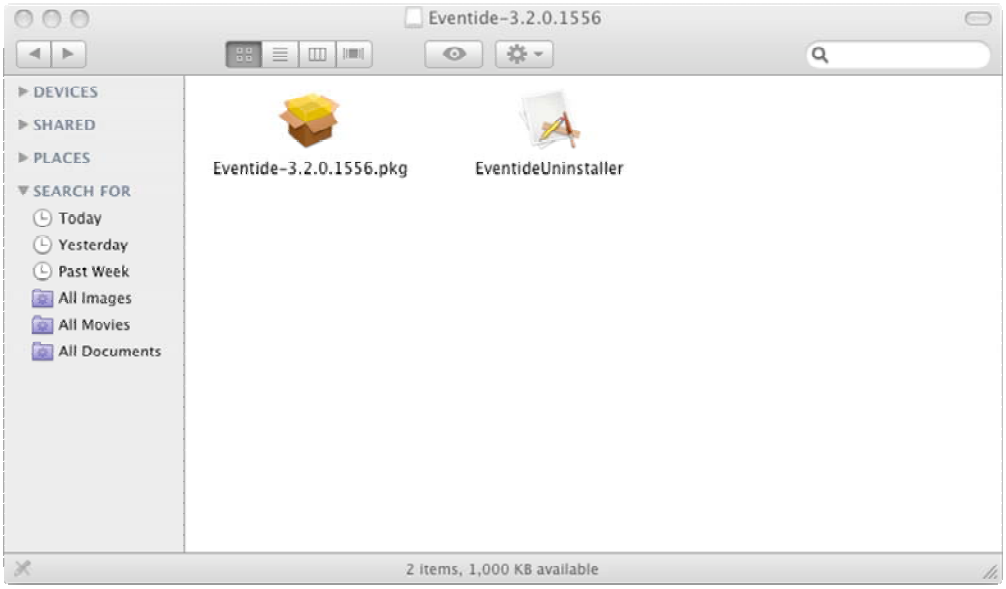
The driver is contained in a file called Eventide.dmg. This may be either on a CD or downloaded from the Eventide Web Site. The latest drivers are always available from the Support section of the Web Site.

The version numbers displayed (i.e. 3.2.0 etc) may differ from those you see during the installation. Depending on the driver version, the H8000FW may be known to the computer as either **H8000** or **Eventide Dice**.

Make sure that the H8000FW is either powered down or its FireWire cable is disconnected.

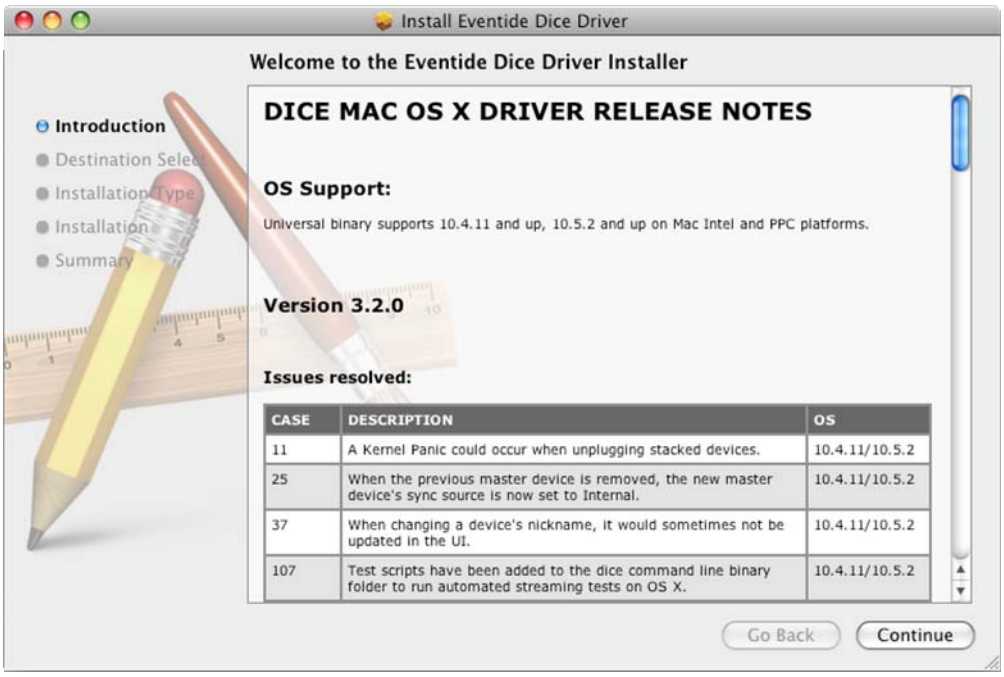
Once you have located the dmg file, double-click it to view the contents.

A loading notification window briefly displays, then the following two files, **Eventide_*.pkg** and **EventideUninstaller**, display:



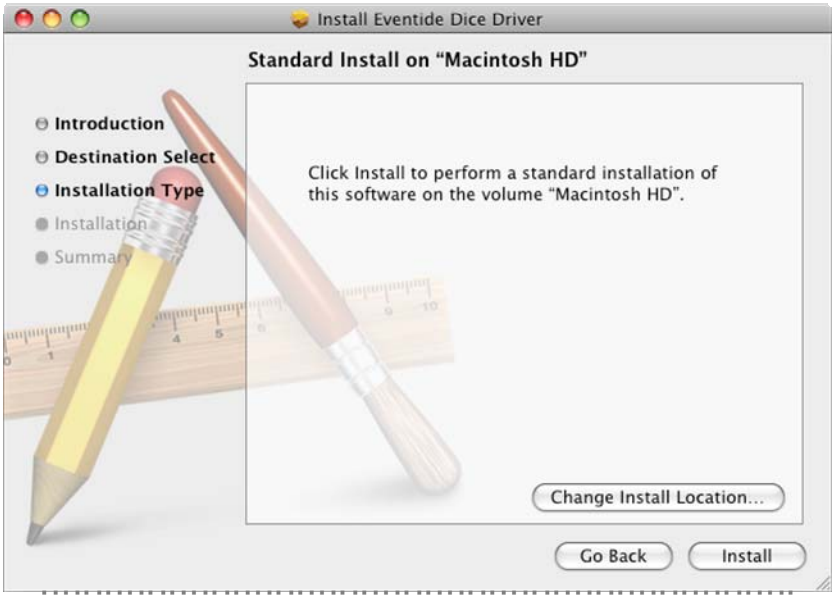
Double-click **Eventide _*.pkg** to proceed.

- The first installation screen now displays:



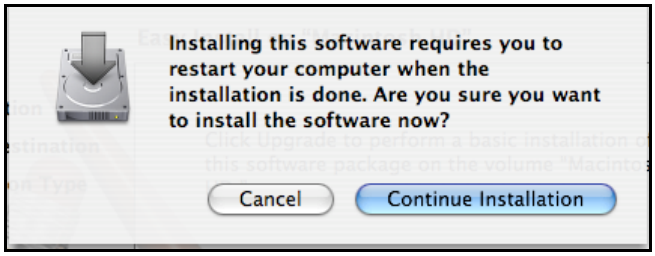
- The Release Notes show information about the current release – this is often rather technical. Click **Continue** to proceed.

- The next installation screen (below) prompts you for the destination drive for the H8000FW drivers:



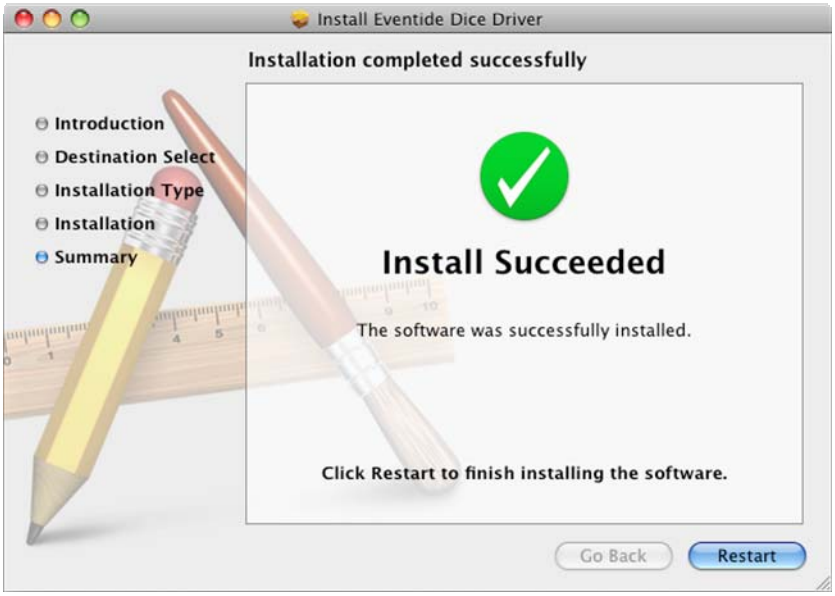
Note that if your Macintosh has more than one hard drive, the H8000FW drivers must be installed to your boot drive.

- Click **Install** to proceed.
- Next, a window displays to inform you that a restart is required after the installation process is concluded:



- Click **Continue Installation**.

The installation process now begins. A status bar displays the progress of the installation. After the install completes, a prompt displays to restart your computer (next page):



- Click **Restart** to restart your computer and conclude the installation.

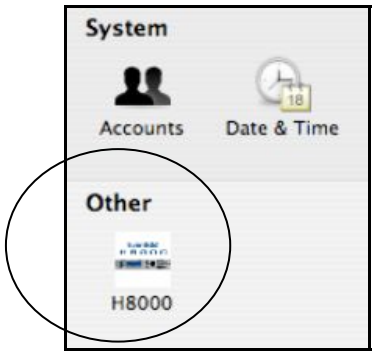
Configuring the H8000FW for Macintosh Output

Once all software drivers have been installed, perform the following steps to enable Macintosh audio output via the H8000FW.

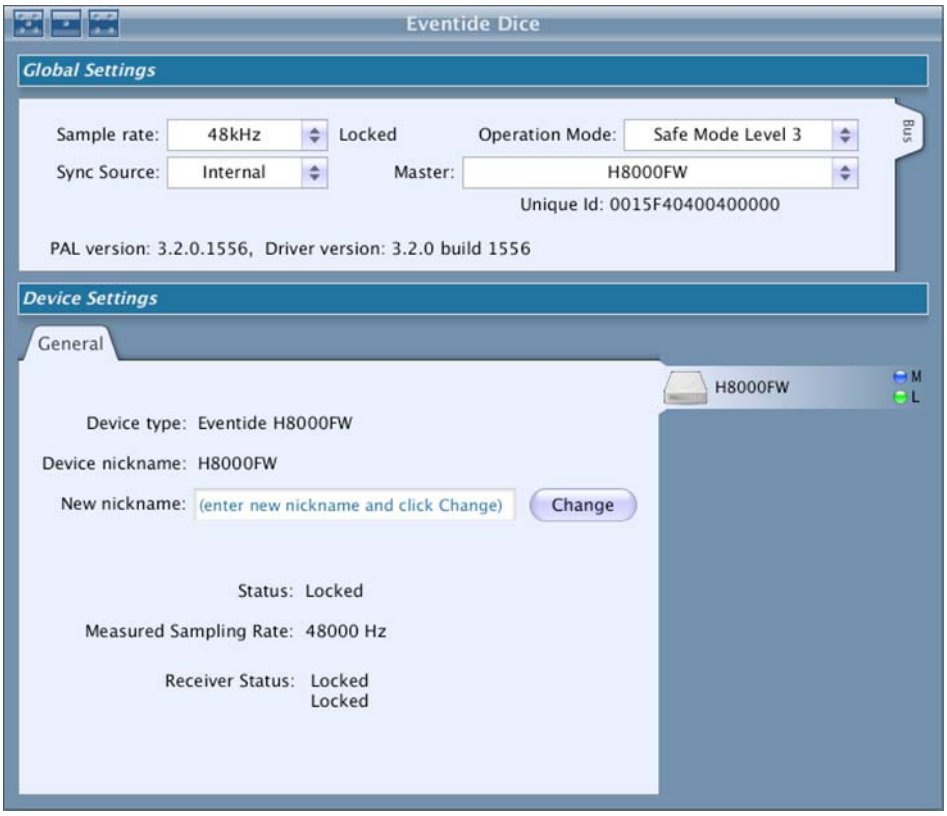
Note: *Before proceeding, be sure your Firewire connection between the Macintosh and the H8000FW is established, and the H8000FW is configured to pass audio.*

Viewing the H8000FW's Configuration

To view the configuration of the H8000FW, click **Show All** from the Sounds screen to return to System Preferences. Then click **H8000FW** from the **Other** category (below):



The following screen displays, which lists the device settings for the H8000FW:



Note: *Initially, the Available Devices, Device Nickname, and Master Device will read something cryptic like "MyProduc12345456." Feel free to rename it to something a little more descriptive.*

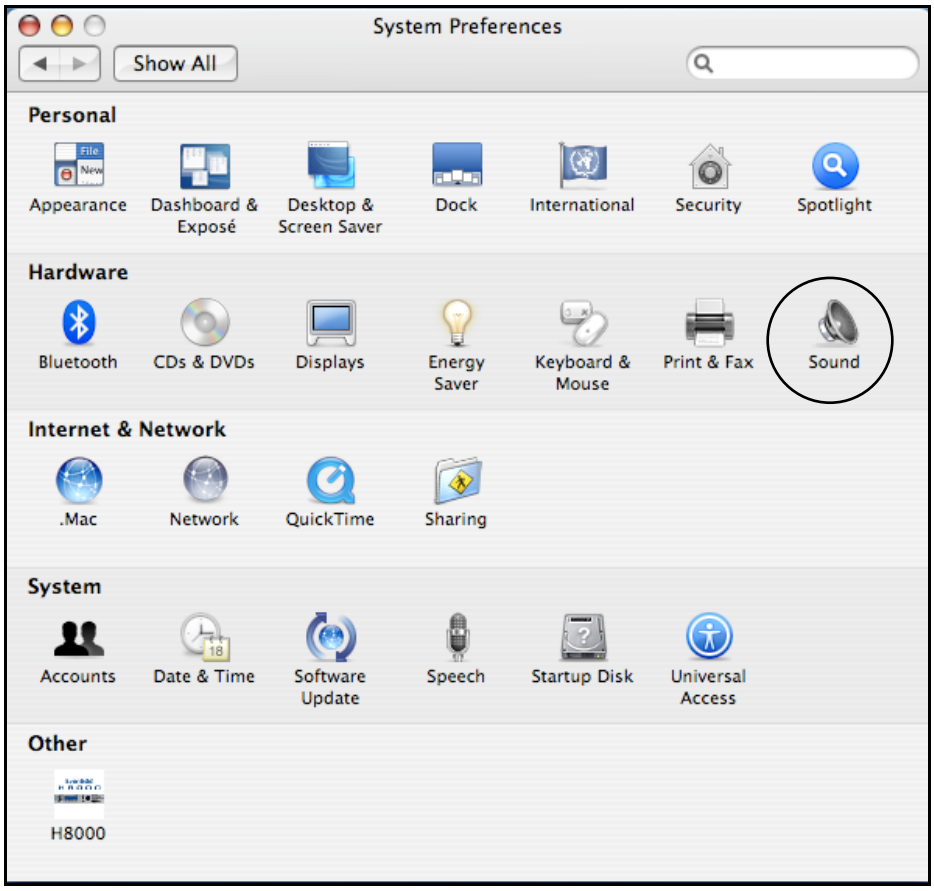
After the H8000FW is selected as your output device, go ahead and test your connection.

- From the **Sounds** screen, select the **Sound Effects** tab. Beneath the listing of installed sound files, select **Eventide H8000FW** from the drop-down list following "*Play Alerts and Sound Effects Through.*"

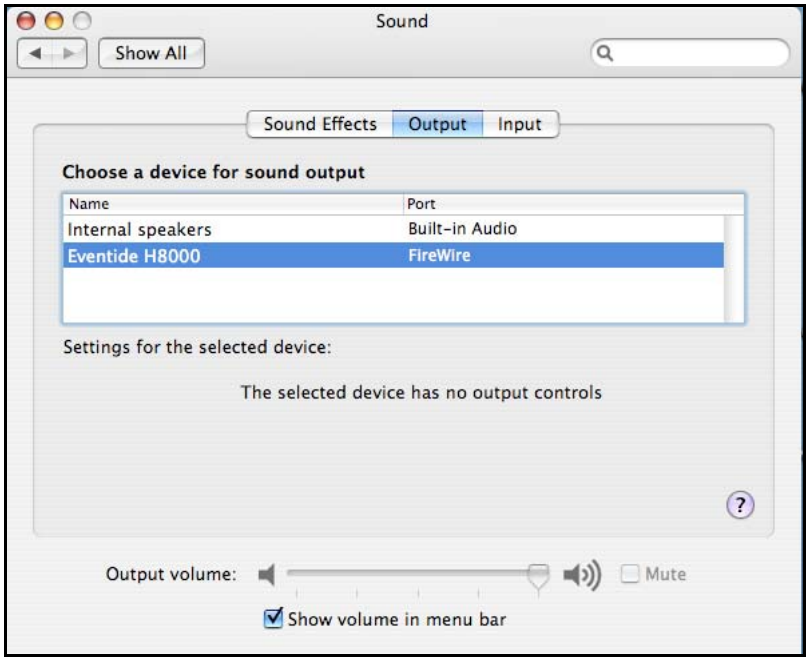
- Now, click on any listed sound file, and you should see the LEDs on the left side of the front panel light up; this reflects that the signal has been received and is being processed by the H8000FW. Of course, if you have speakers connected, you'll hear the output as well.

Setting Up the H8000FW for Default Audio Output

- Click on the **System Preferences** icon; when its window displays, select **Sound:**



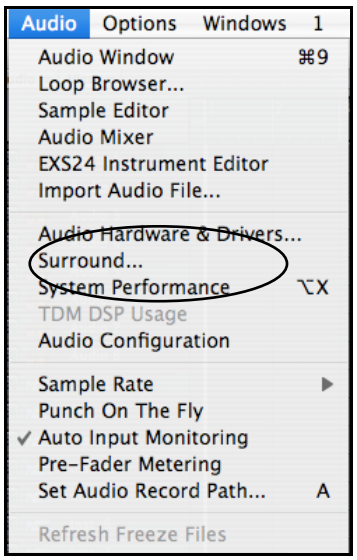
The Sound options screen now displays:



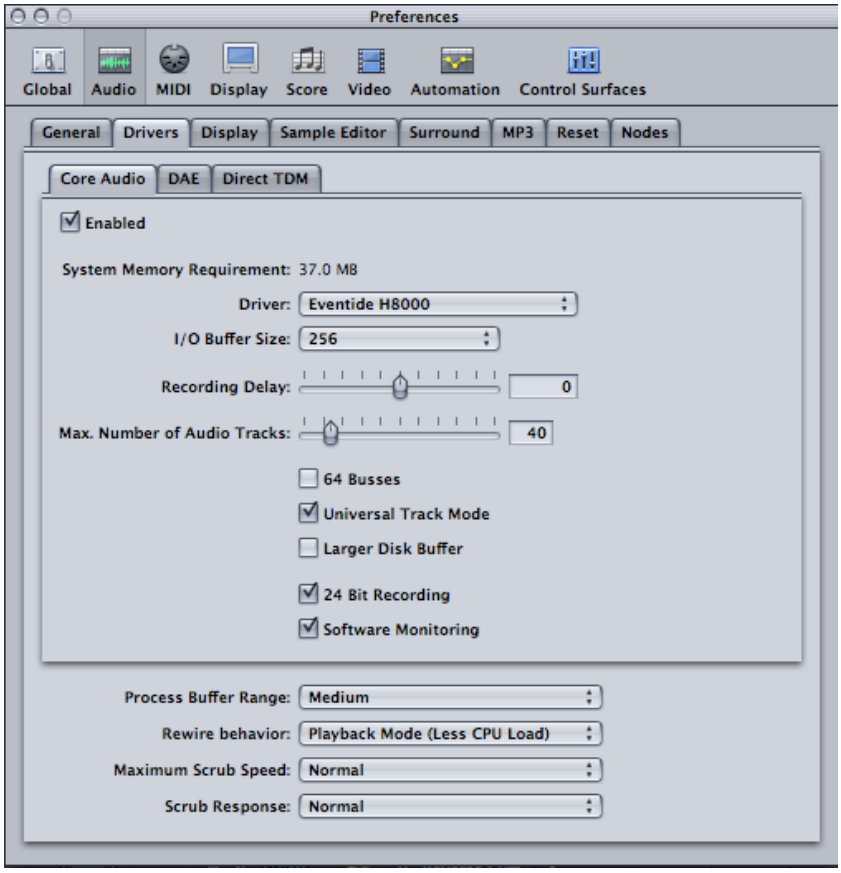
After selecting the Output tab, **Eventide H8000** displays as an output device, along with its port type, **Firewire.** Highlight it to select it as your output device and to override the default output device on your computer.

If you wish to use Logic Pro as your audio editing and authoring platform in tandem with the H8000FW, do the following:

- Open Logic Pro, and from the **Audio** drop-down menu, select **Audio Hardware and Drivers:**



The following screen displays:



- From the Core Audio tab, be sure the Enabled checkbox is selected, and Eventide H8000FW is selected as your driver.
- You now will be prompted to restart your computer for the new settings to take effect.

Routing Audio Between Logic Pro and the H8000FW

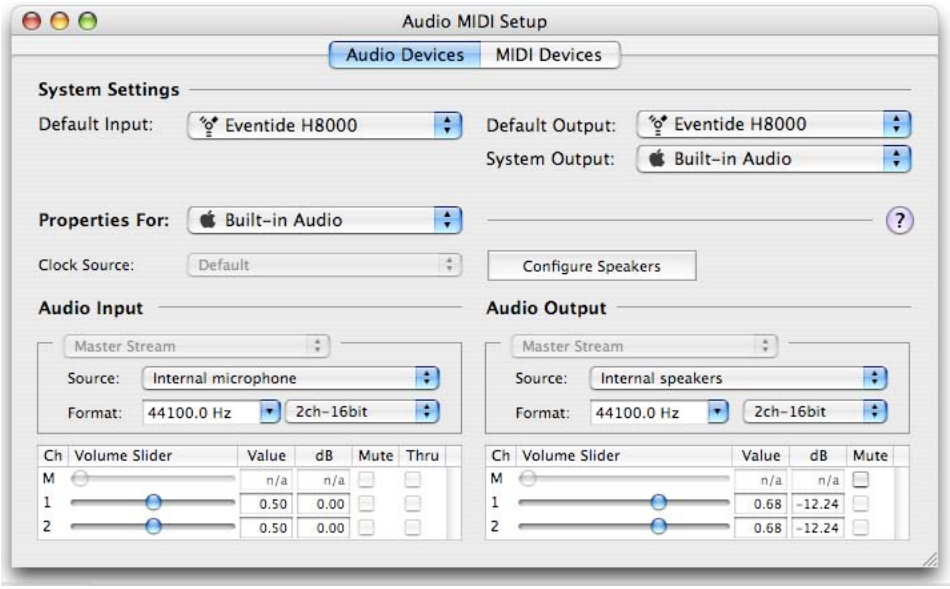
This section describes how to establish a functional interface between the H800FW and Logic Pro, which permits you to seamlessly route audio to and from either environment. The final section provides the logical overview of the process, and includes a process diagram for you to better grasp the steps involved.

Because Logic Pro supports only one core audio device at a time, and because only one sample clock can be in effect, we must combine audio sources into a single, aggregate audio source, described below.

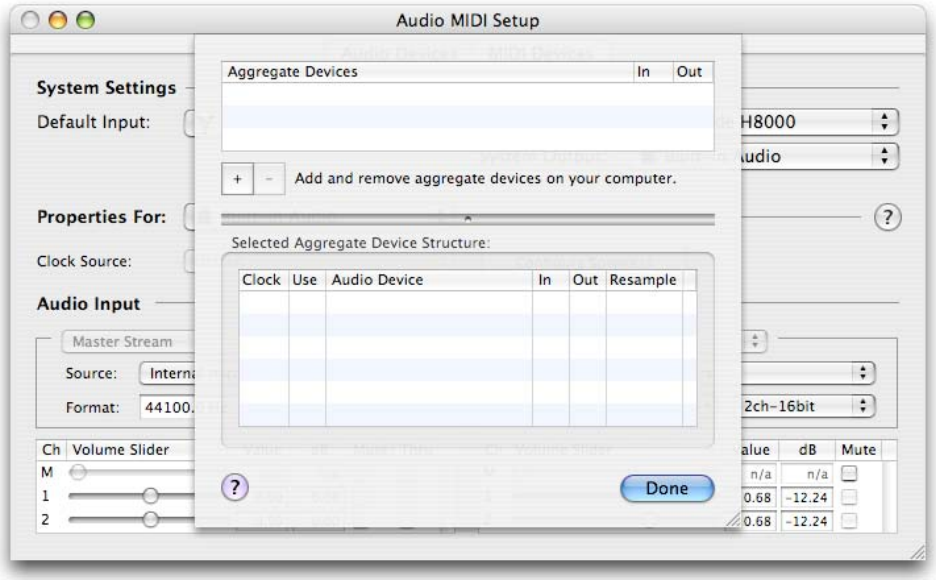
Creating an Aggregate Audio Device

Before you proceed, you must first create an aggregate audio device that allows Logic Pro to employ more than a single audio interface. To do this,

- Select your **Macintosh HD** icon. When the Finder window displays, go to **Applications > Utilities > Audio MIDI Setup.** The following screen displays:

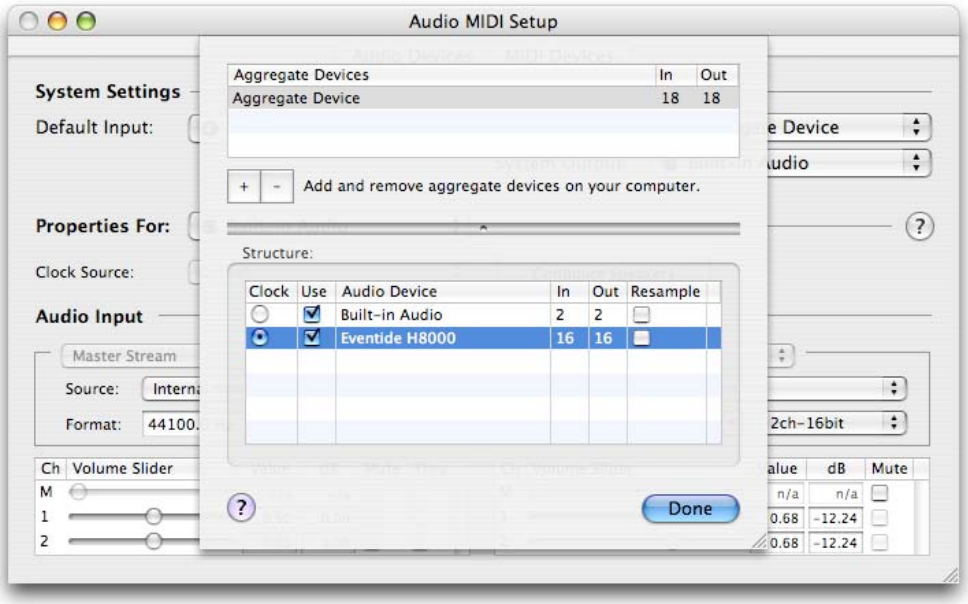


- From the Audio drop-down menu, select Open Aggregate Device Editor.
- The following window now displays (below). It is from here that you designate which audio input devices to include in the new aggregate.



- Click the "+' button beneath the Aggregate Devices area. A listing of all installed audio device drivers subsequently displays. Click in the checkbox to the left of the device to select it for this aggregate device. Also select one of the devices for the aggregate's internal clock. For this example, we'll be using the Eventide HW8000FW and Built-in Audio as our audio devices. Click Done

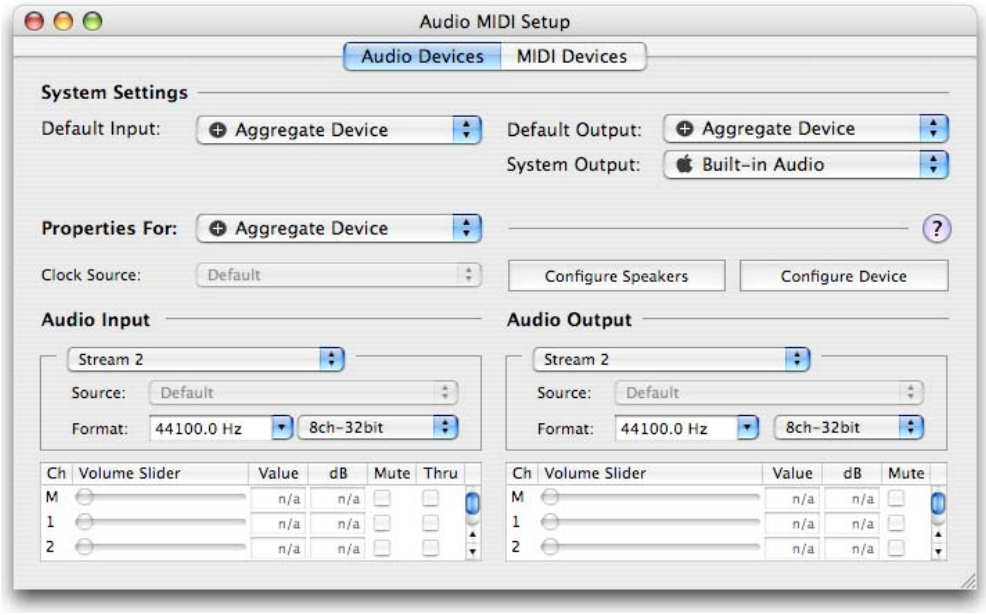
- When we're finished, the setup looks like this:



At the top of the screen, the aggregate device, comprised of the two audio devices we selected, displays, with its total number of input and output channels. At the bottom of the screen each individual audio device is listed, with its input and output channels capacity.

Note that the sequence the devices are listed is a very important consideration. As Built-in Audio precedes Eventide H8000FW in the listing, it consequently reserves the first two of the total 18 audio channels for the Built-in Audio device, leaving channels 3-18 for the H8000FW. This will be of paramount importance when routing the audio to the H8000FW.

After all parameters for the Aggregate Device are established, your Audio MIDI Setup screen will display like this:



You may view the setup of the Aggregate Device by clicking the **Configure Device** button.

For more information on creating Aggregate Audio Devices, consult Help from your Macintosh's menu bar.

Routing Audio to the H8000FW

Now that you have created an Aggregate Audio Device, you must configure the H8000FW to accept and generate audio signals.

To do this

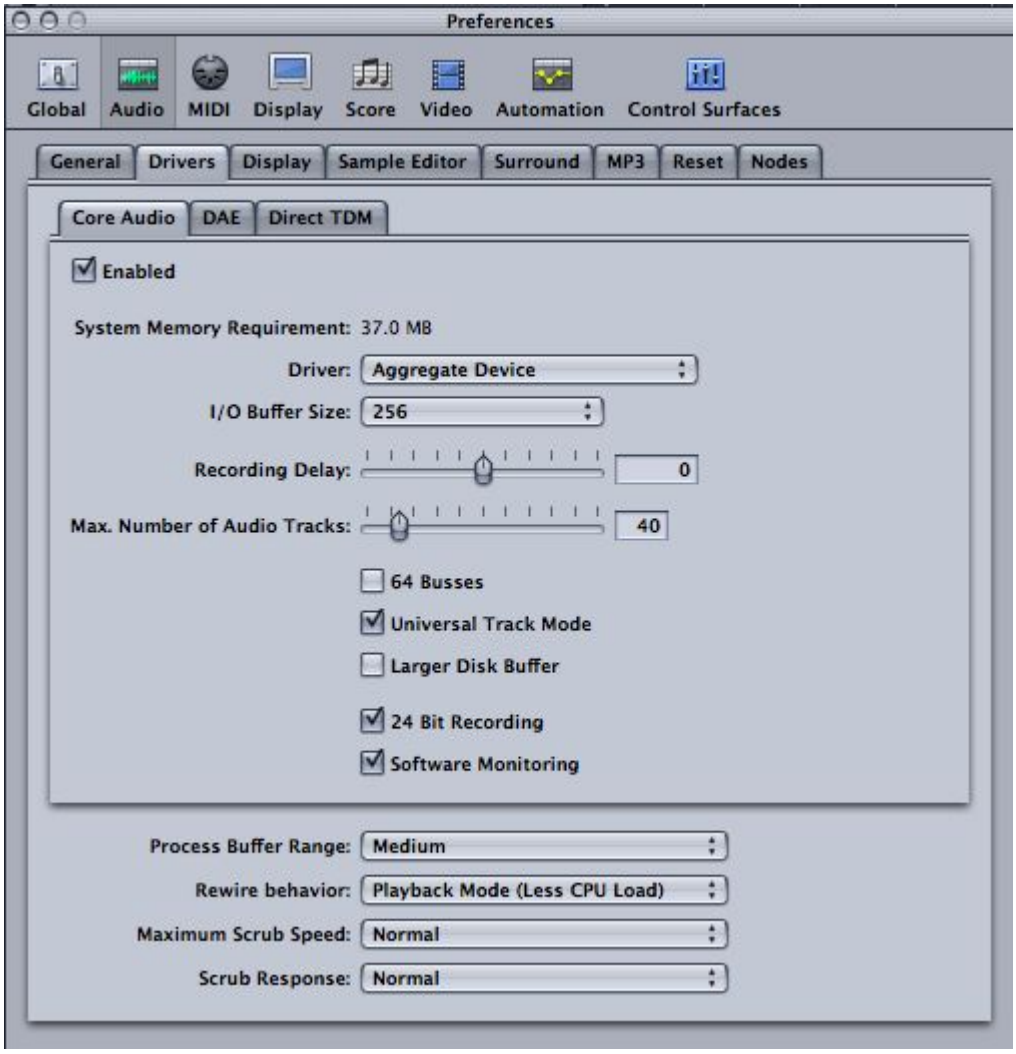
- Press the **Program** button on the H8000FW's front panel until it blinks. Check to be sure the Routing screen is displaying.
- Using the front panel's keypad, enter **20,** then **ENT.** Finally, press the **Select** button.

These actions establish the H8000FW's internal routing configuration.. The number 20 routing preset on the H8000FW, **Firewire 8Track AB,** supports 8-track input and output: channels 1-4 are routed to and from the H8000FW's machine A, channels 5-8 are routed to and from its machine B.

Configuring Logic Pro for H8000FW Input and Output

To permit Logic Pro to send and receive audio from the H8000FW, you must change to audio its settings to recognize the aggregate audio device we just created.

- Open Logic Pro, and from its **Audio** menu, select **Audio Hardware & Drivers.** The following screen displays:



- From the **Driver** drop-down list, select **Aggregate Device** (as shown above).

You now will be prompted to restart Logic Pro for the new settings to take effect.

The following example illustrates using the H8000FW as both an insert and a bus effect with Apple's Logic Pro 7.

We are using the aggregate audio device we set up in the previous section, consisting of Built-in Audio (channels 1 and 2) and the Eventide H8000FW (channels 3-18). The routing preset we have selected on the H8000FW is **20, Firewire 8 Track AB**, which is preset to process channels 1-4 using its machine A, and channels 5-8 using machine B.

In Logic Pro, we have configured the routing with the aggregate audio device as follows:

- Audio 1 receives input in channels 1 and 2, and sends output to channels 1 and 2;
- Audio 2 receives input from channels 7 and 8, and sends output to channels 1 and 2.

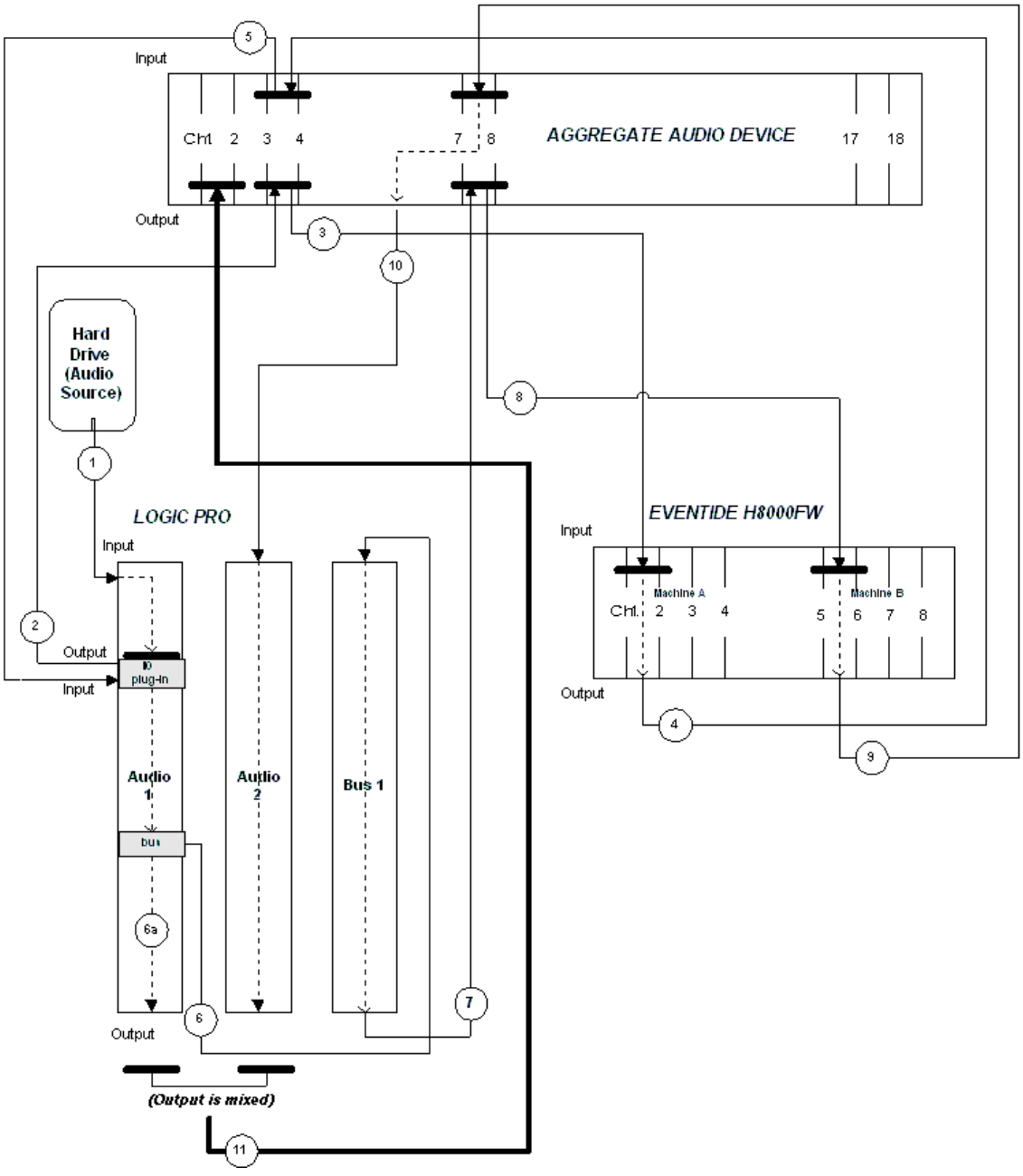
Audio 1 also has an insert plug-in that routes output to channels 3 and 4, and a bus, which outputs to channels 7 and 8 on the aggregate audio device.

These settings are reflected in the following illustration of the Logic Pro Mixer screen:

The following diagram provides the logical overview of the routing between Logic Pro, the aggregate audio device, and the H8000FW. Each step, numbered 1-10 in the diagram, is duly described in the next section. The numbers display in the diagram at or near the initiation point of the process.

Note that each directional line between entities represents a single stereo pair.

Routing Diagram Between Aggregate Audio Device, Logic Pro, and the H8000FW



Step-by-Step Descriptions of the Routing Process Flow

The audio source from the hard drive is sent to *Audio 1*. Once it is received, it encounters the I/O plug-in insert, a plug-in that routes the audio to an external audio device.

The insert outputs the audio to channels 3 and 4 of the aggregate audio device, since channels 1 and 2 are reserved for final speaker output.

The aggregate audio device subsequently sends the output from its channels 3 and 4 to the H8000FW's input channels 1 and 2. As the aggregate audio device's first two channels are internal audio, its input channels 3 and 4 correlate to the H8000FW's channels 1 and 2, its channels 5 and 6 with the H8000FW's channels 3 and 4, and so on. As defined in its Routing Preset 20, the H8000FW's DSP machine A processes channels 1-4; its DSP machine B process channels 5-8.

Processing is performed to the audio on the H8000FW, and the processed audio is output from its channels 1 and 2 to the aggregate audio devices input channels 3 and 4.

The audio is now input back to I/O plug-in on *Audio 1*. The audio now proceeds to encounter the bus we inserted.

The bus routes the audio and sends one stream to the *Audio 1* output and a second stream to the *Bus 1* input.

The bus audio is subsequently sent to the aggregate audio device's channels 7 and 8 outputs, as defined in the Logic Pro session.

From here, it is routed to the H8000FW's input channels 5 and 6.

Processing is performed on the audio using the H8000FW's machine B, after which it is sent through the H8000FW's output channels 5 and 6 back to the aggregate audio device input channels 7 and 8.

This audio stream now is routed to *Audio 2,* as defined in the Logic Pro session.

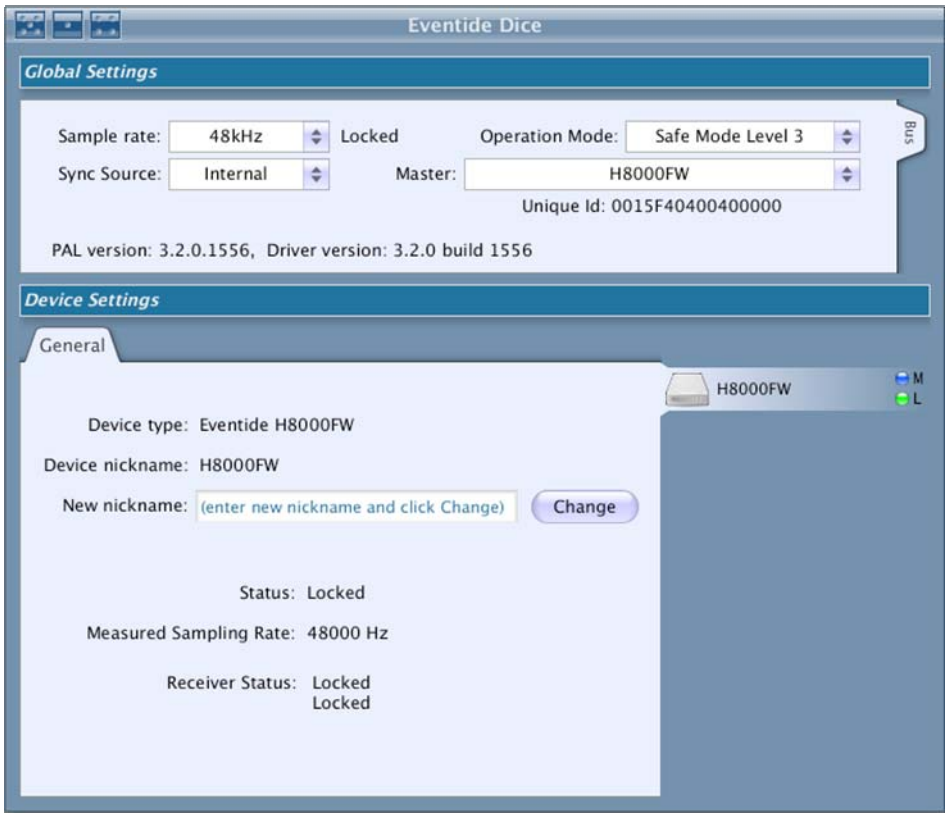
Finally, outputs from *Audio 1* and *Audio 2* are mixed, as defined in the Logic Pro session, and returned to the aggregate audio devices output channels 1 and 2, which are in fact the speakers. All that's now left to do is listen.

The Macintosh Control Panel

This is similar to the Windows Control Panel, but is simplified by not needing to support WDM. See the Windows Control panel section on page 170 for a description of each field. It may be launched from your DAW application or directly from the Applications folder, where it hides under the unlikely title of **Eventide Control Panel**.

The Mac panel does not contain the DPC analyzer featured on the Windows panel, so the **Operation Mode** must be set by trial and error. Start with **Normal** mode. If you experience significant dropouts or **Locking/Unlocking** in normal use, drop down a level (more if necessary).

Safer (higher numbered) **Operation Modes** are more likely to be needed if you have a slow computer, heavy network use, or have significant FireWire use by other devices (e.g. external hard drives). Be aware that this safety comes at the price of increased latency.



Troubleshooting Mac systems

- Where possible, disconnect network cables or avoid network use during critical playback.
- If you encounter dropouts or Locking/Unlocking, use the Control Panel (see above) to change the Operation Mode to a safer setting .
- Using FireWire drives as well as the FireWire audio interface (e.g. that to the H8000FW) should be avoided.
- Since much of the I/O on a Macintosh is performed in software, you need one of the faster CPUs to do serious multi-channel work.
- Using the H8000FW with Windows running under ***bootcamp*** prior to OS 10.5 is not recommended.

Electrical Specifications

Sample Rates

96kHz, 88.2kHz, 48kHz, 44.1kHz or external.

Frequency Response

Sample Rate	*44.1kHz*	*48kHz*	*88.2kHz*	*96kHz*
+0/-0.1dB	20Hz-20Khz	20Hz-22kHz	20Hz-41kHz	20Hz-44kHz
+0/-3.0dB	5Hz-21Khz	5Hz-23kHz	5Hz-42kHz	5Hz-46kHz

Digital Inputs/Outputs

	AES with SRC and relay bypass 44.1-96kHz	Additional AES 44.1-96kHz	S/P DIF (uses AES channels)	ADAT 44.1/48 kHz	SMUX 88.2/96 kHz	FIREWIRE 44.1-96kHz
H8000FW	4	8	2 44.1-48 kHz 2 44.1-96kHz	8	4	16

Analog Input (XLR Balanced Inputs)

Impedance	>20kOhm, bridging
Full Scale Input Level	26dBu
Dynamic Range	>110dB
Signal to Noise Ratio	>110dB, A-weighted
THD+N	<0.002% @ 1Khz, -3dBFS
Crosstalk	<-100db @ 20 Hz to 20kHz, -1dBFS

Analog Output

Impedance	<50 Ohm
Full Scale Output Level	26dBu
Dynamic Range	>110dB
Signal to Noise Ratio	>110dB, A-weighted
THD+N	<0.002% @ 1Khz, -3dBFS
Crosstalk	<-100db, 20 Hz to 20kHz, -1dBFS

Remote Control Inputs

Up to 2 foot pedals (or 0-5V control inputs), or 6 foot switches, or combination.

Remote Control Outputs

2 isolated relay closures, rated at 1A 30VDC.

MIDI Connections

5 pin DIN output and thru
7 pin DIN input with output capability

Memory Card Interface

68 pin PCMCIA 2.0/JEIDA 4.0 for data storage. Supports the following:
PCMCIA type 1 SRAM cards
PCMCIA ATA cards
Compact Flash™ cards with suitable adaptor.

Factory Preset Capabilities (at 48k sampling)

Pitch shifting:	up to 16 channels
Compressor/limiter:	up to 16 channels
Equalization:	up to 128 bands parametric single input, 16 bands at 8 channels
Sampling with time compression:	up to 174 seconds mono
Digital delay:	up to 87 seconds mono in addition to sampler

Power

100 watts 100-125V, 220-240V, AC 50/60Hz

Size

Inches:	3.5h x 19w x 12.5d
Cm:	8.9h x 48.3w x 31.7d

Weight:

12 pounds (5.5 Kg) net
17 pounds (8Kg) shipping weight

All specifications are subject to change or improvement at any time without notice or obligation.

Warranty Information

WARRANTY INFORMATION_____MODEL

LIMITED WARRANTY

The above-identified Eventide unit covered by this warranty is built to exacting quality standards and should give years of trouble-free service. If you are experiencing problems which are not cleared up in this manual, your recourse is this warranty.

What the warranty does and does not cover

Eventide Inc. warrants the above-identified unit to be free from defects in workmanship and material under normal operation and service for a period of one year from the date of purchase, as detailed below. At our discretion within the warranty period, we may elect to repair or replace the defective unit. This means that if the unit fails under normal operation because of such defect, we will repair the defective unit at no charge for parts or labor. We also assume a limited responsibility for shipping charges, as detailed below.

The warranty does not extend beyond repair or replacement as stated herein and in no event will we be responsible for consequential or incidental damages caused by any defect, and such damages are specifically excluded from this warranty. Our sole obligation is to repair or replace the defective unit as described herein.

The warranty DOES NOT COVER any damage to the unit regardless of the cause of that damage. The unit is a complex piece of equipment that does not react well to being dropped, bounced, crushed, soaked or exposed to excessively high temperatures, voltages, electrostatic or electromagnetic fields. If the unit is damaged for these or similar causes, and the unit is deemed to be economically repairable, we will repair it and charge our normal rates.

The warranty DOES NOT COVER shipping damage, either to or from Eventide. If you receive a new unit from us in damaged condition, notify us and the carrier; we will arrange to file an insurance claim and either repair or exchange the unit.

If you receive a new unit from a dealer in damaged condition, notify the dealer and the carrier.

If we receive the unit from you with apparent shipping damage, we will notify you and the carrier. In this case, you must arrange to collect on any insurance held by you or your carrier. We will await your instructions as to how to proceed with the unit, but we will charge you for all repairs on damaged units.

Who is covered under the warranty

The warranty applies to the original purchaser of a new unit from Eventide or an Authorized Eventide Dealer. Demo units are also covered by this warranty under slightly different circumstances (see below). Units that are used, or have been used as part of a rental program, are not covered under any circumstances.

It is your responsibility to prove or to be able to prove that you have purchased the unit under circumstances which effect the warranty. A copy of your purchase invoice is normally necessary and sufficient for this.

If you have any questions about who is an Authorized Eventide Dealer, call us.

Units with the serial number plate defaced or removed will not be serviced or covered by this warranty.

When the warranty becomes effective

The one-year warranty period begins on the day the unit is purchased from an Authorized Eventide Dealer or, if the unit is drop-shipped from Eventide, on the day shipped, plus a reasonable allowance for shipping delays. This applies whether or not you return your warranty registration form.

When we receive a unit, this is how we determine whether it is under warranty:

1. If the unit was shipped from our factory within the past calendar year, we assume that it is under warranty unless there is evidence to the contrary, such as its having been sold as used or rented, etc..

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2. If the unit was shipped from our factory more than a calendar year ago, we assume it is not under warranty unless:
   a) There is a warranty registration form on file showing that it has been purchased within the past year under appropriate conditions.
   b) You send a copy of your purchase invoice indicating warranty status along with the unit.
3. If the unit was used as a demo, the warranty runs from the date that it was received by the dealer. The original purchaser gets the unexpired portion of that warranty.

When you send a unit for repair, you should indicate whether or not you believe it to be under warranty. If you do not say the unit is under warranty, we will charge you for the repair and we will not refund unless the charge was caused by an error on our part. If you believe the unit to be under warranty and you do say it is but we disagree, you will not incur any charges until the dispute is resolved.

Reading the above, you can see that it is to your advantage to send in the warranty registration form when you purchase the unit. If we know who you are, we can send you updates and notifications, and advise you of our new products. It will also enable you to receive pre-shipment of certain parts.

Who performs warranty work

The only company authorized to perform work under this warranty is Eventide Inc., Little Ferry, New Jersey. While you are free to give personal authorization to anyone else (or to work on it yourself), we will not honor claims for payment for parts or labor from you or from third parties.

However, we and our dealers do try to be helpful in various ways:

1. Our dealers will assist, usually without charge during the warranty period, in:
   a) determining whether there is a problem requiring return to the factory, and
   b) alleviating user error or interconnection problems that may be preventing the unit from operating to its full capability.
2. We are available for telephone consultation if the dealer is unable to assist.
3. If a part is found to be defective during the warranty period and you wish to replace it yourself, we will normally ship the part immediately at no charge, provided your warranty registration form is on file. We reserve the right to request that the defective part be returned to us.

Shipping within the 50 United States

You are responsible for getting the unit to our door at no cost to us. We cannot accept collect or COD shipments.

We will return the unit to you prepaid, at our expense, using an expeditious shipping method, normally United Parcel Service. In areas not served by UPS we will ship by US Mail.

If you are in a hurry and want us to use a premium shipping method (such as air express, next day air, etc.), be sure you tell us and agree to pay shipping charges collect. If you specify a method that does not permit collect or COD charges, remit sufficient funds to prepay shipping.

Shipping outside the 50 United States

If you purchased the unit from a dealer in your country, consult with the dealer before returning the unit.

If you wish to return the unit to us, please note the following:

1. The unit must be prepaid to our door. This means that you are responsible for all shipping charges, including customs brokerage and duties. When a unit is shipped to us it must be cleared through United States Customs by an authorized broker. You must make arrangements for this to be done. Normally, your freight forwarder has a branch in the United States which can handle this transaction. We can arrange to clear incoming shipments for you. If you want our assistance, you must notify us before shipping the unit for repair, giving full details of the shipment, and including a minimum of $250.00 in US funds to cover the administrative and brokerage expenses. Any balance will be applied to the repair charges or refunded. If a balance is due to us, we will request a further prepayment.

2. All shipments will be returned to you collect. If this is impossible because of shipping regulations or money is due us, we will request prepayment from you for the appropriate amount.

3. All funds must be in $US. Payment may be made by check drawn on any bank in the US, or by telegraphic funds transfer to our bank. If you send US currency, be sure that it is sent by a method you can trace, such as registered mail. If you wish to pay by Letter of Credit, be sure that it affords sufficient time for work to be performed and the L/C negotiated, and that it is free from restrictive conditions and documentation requirements.

4. We reserve the right to substitute freight carriers. Although we will attempt to honor your request for a specific carrier, it is frequently necessary to select a substitute because of difficulties in communication or scheduling.

This warranty gives you specific legal rights and you may also have other rights which vary from location to location.

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